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A Monthly Record of Dental Science and Art.

C. W. SPALDING, D. D. S., M. D., Editor.

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ON THE SENSITIVENESS OF PULPLESS TEETH.

BY J. EDWARD LINE, D. D. S., Rochester N. Y.

[Read before the Seventh District Dental Society, 1879.]

At a recent meeting of the Rochester Dental Club, the discussion turned incidentally on this subject. In their anxiety to fortify positions already taken, several members spoke earnestly in favor of the notion, while others quite as earnestly opposed it. In bringing the subject before you we hope to take a more comprehensive view of it than was possible on that occasion, and yet make what we have to present *suggestive* rather than *exhaustive*.

That such a view may be taken it will prove convenient to consider: 1st. Irritants, any of which may be applied to pulpless teeth, more particularly to the walls of the pulp cavities of such teeth, and their effects. 2nd. The anatomical elements met within the pulp, in the peridental membrane, and in that part of the tooth—dentine and cement—which lies between the two. 3rd. Certain notions as to the mode and material of transmission, of nervous impressions.

1st. *Irritants.* These may be classed as mechanical, thermal and chemical.

Mechanical Irritants. The application of an excavator to any part of a tooth will generally enable the owner to determine whether the sensation is a thing to be enjoyed or otherwise. If the former it may be made otherwise by using an instrument possessed of a long shank—a shank elastic throughout.

The movement of the cutting edge of such an instrument over the surface of the tooth has a strong tendency to greatly intensify what before hardly deserved the name of pain. A bur, which is nothing more than a many-sided excavator, gives rise to sensations more disagreeable, if possible, than the simple instrument just mentioned. A fine wire fastened to a tooth, then drawn out and gently tapped with a bit of steel, brings about a not very dissimilar result. A violin string fixed to a tooth by means of a fish hook, well stretched by the fingers of one hand while those of the other industriously ply a bow, produces sensations the most exquisite if not the most enjoyable. A musical instrument of almost any kind, if connected with a tooth by means of wire or catgut, or any combination of the two, will exhibit similar phenomena. These things are true of teeth with pulps or without.

Now, in all these experiments, we have illustrations of molar and molecular motion, and conversions of the one into the other. In a tooth treated as above we have molar and molecular motion; it is equally distributed so far as direct experiment can determine, though seen to be unequally so when reasoned upon; and in the case of a pulpless tooth, manifests itself through or by means of the nerves distributed to the peridental membrane, to which tissue the sensation is readily referred. Here, to put it otherwise, we have motion, vibrating in its character, clearly perceptible in some cases to the unassisted eye, distributed throughout the whole tooth, and announcing its presence through, or by means of, the nerve plexus of the membrane lining the alveolus.

Thermal Irritants.—Thermal changes may be brought to notice by the application of metals, water or air, the temperature of which is much above or below that of the tooth. Such changes may also be induced by withdrawing moisture from the tooth by means of spunk, or by withdrawing moisture, or admitting air after the ap-

plication of the rubber-dam—the tooth being thus left out in the cold. These applications give rise to molecular motion in, or transfer their own to, the tooth tissue, through, or by means of, the nerves of the surrounding membrane. It makes itself known after the manner of mechanical applications, or *possibly* by means of some of those filaments so generously distributed throughout the organism, and which, according to some, justify the belief in a sixth sense.

Chemical Irritants.—Chemical applications give rise to sensations that vary from those hardly noticeable, to the most intense. Many of the acids and caustic alkalies, and substances that can not be readily classed with either, effect the disturbance already mentioned. They may do this in two ways: The application may penetrate the tooth-tissue, and act directly on the nerves of the peridental membrane, or they may act indirectly, by first inducing molecular movement in the solid or broken-down tissue of the walls of the pulp cavity.

Now, while the pain is an undisputed fact, and is producible by the agents already enumerated, the manner of its production—the intermediate link or links by which it is conducted or transmitted, are not so apparent. That there must be a nerve somewhere concerned is a foregone conclusion; but it is by no means conclusive that this nerve must be in the immediate vicinity of the part to which the irritant is applied. It may be remotely situated, and a space of an eighth of an inch or more intervene between it and the sensation-producing agent.

2d. *The anatomical elements met with in the pulp*, etc. The pulp is simply the last trace of what in younger teeth is called the tooth-germ, and consists of a parenchyma or sheath of connective tissue, which supports and binds together in certain relations the vessels, nerves and odontoblasts. In pulpless teeth we have to do with traces of odontoblasts only—their peripheral extremities. In the peridental membrane we find connective tissue, numerous vessels, and a large supply of nerves. In the dentine and cement of a tooth whose pulp has been but recently removed, we find (beginning at the pulp chamber), the peripheral extremities of the odontoblasts, or soft fibre of Tomes, with perhaps here and there a trace of the odontoblasts themselves. We also find the interglobular substance. Next come the contents of the fine tubes, or canaliculi,

radiating from the lacunæ, and in the lacunæ the cement corpuscles. In brief, this is the chain connecting the pulp with the peridental membrane: soft fibre of Tomes, interglobular substance, cement corpuscles with their processes.

3d. *Certain notions as to the mode and material*, etc. A nerve is said to be a fibre, tubular or gelatinous, capable of transmitting impressions. But carrying the inquiry a little further, we find that nerve-tissue, as we know it, is not the only sensation transmitting tissue. Analysis of any tissue brings us finally to what is called germinal matter and formed material. Wherever found, germinal matter possesses the three cardinal characteristics of organization—that of assimilation, growth and development. Formed material has no reproducing characteristic, and is often spoken of as *dead*. But it is anything but dead. On the contrary, it is alive, and is that part of every tissue in which function resides. By virtue of this formed material it is possible for the skin to perform its protective duties; bone to furnish support for other structures, permanent cartilage to break concussions and make certain movements easy, muscles to contract, vessels to alter their capacity, nerves to transmit impressions, odontoblasts to build dentine.

Scattered more or less thickly according to age throughout the body may be found minute particles of organized matter busily engaged in the production of tissue. They are well termed *tissue builders*, for that *and that only* is their business. This organized matter is surrounded on all sides by formed material, irritation of which produces molecular change in all its parts, and develops similar movements in neighboring nerve tissue after the manner considered under the first head of our subject.

In a sound tooth we find these germinal particles in the several tissues of the pulp; in the odontoblasts, in the cement corpuscles, and in the peridental membrane. The connecting links between all of these is the formed material of which you have heard so much. In the pulp we have nerves, in the peridental membrane we have nerves, but none between the two, and yet the pulp appreciates impressions made at the periphery of the tooth, and the peridental membrane takes note of any disturbance in the pulp or in the walls of the pulp chamber. There is no nerve fibre, tubular

or gelatinous, that would for a moment mislead one into confounding it with the soft fibre of Tomes; the characteristics of what is commonly described as nerve fibre being totally wanting, yet there is sensitiveness. Nerves are absolutely essential somewhere on the route to the sensorium, but direct contact is not only generally wanting, but unnecessary.

That this is so I quote from Huxley:

"The results of recent inquiries into the structure of the nervous system of animals converge towards the conclusion that the nerve tissues, which we have hitherto regarded as ultimate elements of nervous fibers, are not such but are simply the visible aggregations of vastly more attenuated filaments, the diameter of which dwindles down to the limits of our present microscopic vision, greatly as these have been extended by modern improvements of the microscope; and that a nerve is, in its essence, nothing but a linear tract of specially modified protaplasm between two points of an organism, one of which is able to affect the other by means of the communication so established."

From this it will be seen that the soft fibre of Tomes may be nerve tissue, not however, as we now understand it, but as may be proven "by the aid of methods which have yet to be invented."

But we are willing to go farther than this and assert that neither nerve tissue nor any modification of it is needed in the tubuli to enable one to appreciate irritants applied to the walls of the pulp chamber of a pulpless tooth. For the proof we look to daily practice. As long as a pulpless tooth continues its attachment to the jaw, irritants applied to the walls of the pulp chamber may be made appreciable. The soft-fibre of Tomes may be dead, the tubuli and interglobular spaces filled with debræ, the great mass of the cemental lacunæ be in the same sad condition and yet irritants applied as above make themselves known.

This is accounted for in the earlier part of this paper and frequently touched upon in other portions where mention is made of vibratory movements of appliances and tissues, chemicals and heat This vibratory movement may be mere change of place among molecules, or it may be change of composition of the transmitting agent.

We draw the following conclusions :

1st. That pulpless teeth are sensitive to mechanical, thermal and chemical agents.

2nd. That to know of the presence of an irritant in the pulp chamber, it is not necessary that the turbuli, or any part of them, contain a nerve fibre or modification of such fibre.

3rd. That movement or molecular change may take the place of the usually imagined connecting link between the pulp chamber and alveolus, whether that movement or molecular change is in the broken-down contents of the tubuli, the normal tubular contents themselves, or the intertubular tissue.

DENTAL REFORM.

BY OUR ENGLISH CORRESPONDENT.

The appearance of the Dental Register completes, it would be a happiness to think, the drama, comedy, or farce, as it will be differently viewed, of so called "Dental Reform." Although this matter has prominently occupied the minds of dentists in the United Kingdom for the last three years, it really began in 1859, when there was established in London a dental school with such a curriculum as might have been expected from those who aim at taking the lead in dentistry in the metropolis. With little appreciation of the progress made by the schools in America which it was intended to more than rival, and with apparently no comprehension of the needs of a great and rapidly expanding profession which has devoped an unmistakable individuality, the promoters of this school proceeded to tack dentistry on to the College of Surgeons as an *inferior* order in medicine, to give its students but little else than a superficial medical education and then confer upon them what we are constantly reminded, is an inferior medical title, that of "Licentiate in Dental Surgery;" or as the "Lancet" sneeringly puts it, "one of those half qualifications which are granted to dentists." It would seem that the promoters of the London Dental School had an idea that dentists, like Uriah Heap, loved to be 'umble. It will be difficult for the American dentist, with his individuality, his love of independence, his pride

in his profession, and his anxiety to excel, to comprehend the state of mind that could seriously contemplate such a system of education with an idea that it could produce dentists; just as it is impossible for him to understand the mental condition, and aims of that class in England which Thackeray and Trollope so vividly describe, who, by a constant use of pseudo-nomenclature are ever aiming at something else than what they appear to profess. Possessing little inward strength, such men can never stand without the props they are constantly erecting. Monoply and protection is, to them, the breath of life; and without it they die. Especially in matters of education is everything the reverse of what other men think justice and good sense. It is not so much for the purpose of knowing a thing as to appear to know it, not to have knowledge for its good to others, or even for its own intrinsic good to the possessor; but for the superiority it gives him over the non-possessor of it. "Knowledge is power," is their view of education; and not so much to deserve a position, as to know how to assume it, is the chief end of their efforts. Education, therefore, is only a form of monoply, which becomes one of the exclusive rights of those who can afford to pay for it, and must be made as dear and as difficult as possible. In reference to reform, said one of its promoters to me, "I do not believe in cheap education." With such a view of education, it will be apparent that the knowledge which costs so much is not to be given away to possible rivals; and that the public is to be regarded as existing exclusively for the benefit of a profession, not the profession as existing for the benefit of the public. Not to impart the knowledge necessary to make a skillful dentist, but to give the student the appearance of superior education appears to have been the central thought which controled this matter. And nearly all the distinctive and peculiar knowledge necessary for a dentist to possess, appeared to be held in contempt, or as something quite too manipulative for the superior persons this curriculum was going to produce. I have read somewhere the statement of an American gentleman, who had called on a leading London dentist. to the effect that the latter had said to him, "you Americans make a great deal of filling teeth; we leave that to our assistants while we attend to more professional matters." The author of that statement, had, without doubt, much to do with the curriculum

of the London school, and would have assured his American brother that it was far superior to any of the American colleges. If the dentist can leave filling teeth to his assistant, and the making of false ones to his mechanical workman, he has little else to do than take the fees. The same thought that was expressed by this London dentist, had a mouth piece at the last meeting of the American Dental Association in an American dentist, who, although he may not be in sympathy, is undoubtedly in communication with these notions, where he refers to the Americans settled here as possessing mere "finger craft," and as being in comparison to the English dentists, deficient in education. Although I do not wish to emulate these unnecessary comparisons, let me here remark that the assumption so often made by the leaders of reform of the superiority of the English dentist in general or medical education, has no foundation. That the American dentists might be much better educated is quite true, but they are, to say the very least, quite the equal of their English brethren. The little knot of men in London who are responsible for this opinion, assert it so vehemently, that it is quite too often taken for granted without inquiry.

Let any one consult the English and American dental publications, or, the proceedings of the Odontological Society—the only distinctly scientific society of dentists in England—as regularly reported, and compare them with the reports of the numerous societies in America, and he cannot doubt the truth of what I have asserted. The arguments by which the American dentist is made to appear inferior in education, are as amusing as they are ingenious. We find there is a constant reiteration in America of the necessity for higher dental education. *Ergo*, those who make a demand for more education must be ignorant, while those who are content with what they have and make no such demand, must be learned. The logic is conclusive to the logicians who use it; but to a man of sense, the matter appears somewhat different. There can be no desire to excel if we suffer conceit to teach us that we already know enough. Progress in education presupposes that we consider our present stock of knowledge insufficient. The result is that we strive for more. For self-satisfaction to construe the aspiration of the lovers of progress into evidence of their inferiority, is a subject better

suited to the mental and moral powers of the Reverend Petroleum Volcano Nasby, than a sober, hum-drum dentist like myself.

This sneer at finger craft, as well as the assumption that filling teeth was merely a mechanical operation, quite beneath the attention of a man of culture, is like the vaporings of a man who, having acquired a little theoretical knowledge of music, referred to Reubenstein and Halle as men with merely a certain amount of *execution* on the piano forte; and Norman Neruda, Strauss, and Joachim as merely dexterous manipulators of the violin. Punch, who is a determined hater of all shams, touched off this class most admirably a few years since. Gabriel Tinto, a young artist, had a call from some admirers. Being modest, he cut away and left Bouncer, his factotum, to do the honors. Of course, that individual spread himself, and talked of *our* pictures and *our* effects, and so on, until one of the young ladies said: "Mr. Tinto must find you very useful, Mr. Bouncer?" "Oh, yes!" was the reply; "hi does hit most hall. Hi gets the canvas, and prepares the paints, and places the heasel, so that hall Mr. Tinto does his to daub hit hon." Without doubt, while Mr. Tinto was daubing, the great Bouncer was attending to the more professional matters! The result of the curriculum of the London school was what was certain to follow. It made no impression on dental progress, nearly all of which continued, as before, to come from the other side of the Atlantic. Its students were few, and its graduates, as such, were no where regarded as having superior technical education, or as above the average dentist in manipulative skill. Even more than this might of truth be said, but I forbear. When a comparison is made between the status acquired in twenty years—from 1839, the year the Baltimore College was established, to 1859, the year the London school was started—by the American Colleges, with all their disadvantages, and that obtained by the London school, with all its advantages in the same time, there is overwhelming evidence that something is radically wrong in the organization of the latter.

In face of this condition of things, what was the profession to do. The three or four Americans that had settled here prior to 1859 had increased to a goodly number. Englishmen had begun to go for the D. D. S. degree; for it, and not the L. D. S. license, was the passport to a good practice; and there had become firmly estab-

lished in the public mind the idea that American dentistry possessed something it was desirable to have. Moreover, the number of dentists with little or no instruction increased daily. Something obviously must be done.

What ought to have been done was apparent enough; and it would have been done if simple common sense could have been imparted into the matter. The question whether we are, or are not—and if so, to what extent—a branch of medicine, is not here under discussion. But the absurdity of making us, if a part of, an *inferior* body in medicine, is obvious; and this absurdity reaches a climax when it is perpetrated by men whose practice consists mostly in mechanical work. Everything clearly indicated that the time had arrived for the establishment of dentistry on a broad basis, and as an independent body.

The advantages of London in taking the lead in this matter are immense. It possesses every educational appliance, has wealth ready to be literally poured out in every good or necessary cause, and it is in easy distance to any part of the kingdom. Moreover there are students all over the country anxious to be taught, and ready to flock to any school the moment it gives evidence that it is prepared to impart the instruction necessary to make a man really a dentist, that has the power to command a practice as such. There should, then, have been established in London a school for the thorough teaching of dentistry proper and as a distinct and entirely independent profession. The details of its organization might have included the making use of an established Medical institution for the attainment of the necessary medical knowledge in conjunction with its teachings, or it might have left the student to get that knowledge how he might and as best he might; only the knowledge he must have before he could pass the examination. What should have been the standard for that Medical knowledge is an open question; but if it was decided that the student was to have a purely medical degree, let it be one in which he could take pride, as the M. D. of the Universities, or full membership of the College of Surgeons, and not something that marked him as an inferior being. And when the stated course of study which should be arranged so as to occupy the *least* time and entail the *lowest possible* expense to the

students for thorough efficiency was completed and he was submitted to a genuine practical and thorough examination, some distinctive title which showed that he had been instructed as a *dentist* should be granted him, the *exclusive* possession of which should be guaranteed by law, and not shared by the favored few the licensing body chose to give it to, *Sine* curriculum. When such a school had been established all the world should have been searched, and if any one person, or people, possessed anything that could enrich its curriculum, it should have been got; and if any one did anything in a superior way, it should have been adopted. So many Americans could not have come here if they had not brought something for which there was a demand, and which added to the general stock of dental knowledge and skill. Whatever that attainment was, it should not have been left to them as a practical monopoly, but have been incorporated into the English system, until the English dentist not only rivaled, but more than rivaled, the American in every excellence, and the latter would as soon have thought of shipping a cargo of coals from Philadelphia to Newcastle as to get a practice here on an American reputation. Then our English school with such a curriculum and such teachings would have become the leading dental institution in the world; the American invasion would have ceased from lack of support; and we should have effected, in a few years, and in a satisfactory manner, just the reform needed. A higher class of men would have gone into the profession, and we should have had a body of really —and, indeed, highly— educated dentists, who would have held their own with other professions, have taken superior positions in society, and the leading practices wherever they settled, either at home or abroad, from the simple fact that as the public found the holder of the English degree to excel, it became the passport to success. And also, in the simplest manner possible, the ranks of the inefficient and, in the legitimate and not legal sense of the word, unqualified dentist, would have gradually diminished, as the really and not parlimentarily qualified man took his place. In other words, instead of protecting inefficiency and mediocrity by law against competition, what should have been done was to give the dentist an opportunity to protect himself by means of superior knowledge and skill.

Now, why was not this obvious, common sense, and eminently patriotic course pursued? For a very simple reason. The school master can only teach what he knows, and what he does not know he naturally regards as not worth knowing. So, instead of the school meeting the wants of the student, it had to be organized to meet the necessities of the gentlemen who aim at being regarded as the bright and shining lights in our dental world. It is easy to get a modicum of purely medical knowledge where there are such facilities as in London, but to get a practical knowledge of dentistry, would have necessitated an acknowledgment of indebtedness to those men who are to be be-littled and, were it possible, exterminated. Therefore, instead of dental education, we have a curriculum in which it is, at best, but feebly taught. Instead of bread the student gets a stone; and his craving for more skill is met with sneers at it as mere finger craft, and the demand for it on the part of the public, evidence that it does not understand what is good for it, and must be protected against its own folly. Under such conditions there could be no progress. The public held the L. D. S. degree in no esteem—indeed it remained almost unknown—and as it was unable to give the possessor a superior position, it must have by law what it could not attain by merit. Moreover, the Americans increased, and so did the numbers at large.

Then commenced dental reform. In harmony with past proceedings, what ought not to have been was the rule of action. The whole affair was concocted in London; but instead of calling a meeting there, it began by means of a circular from an obscure dentist in an out of the way district in the North, who was heard of no more in the matter, calling a meeting of dentists in Manchester, to consider the necessity for *protecting* the profession from the invasion of unqualified persons. From such a source such a proposition was too amusing for notice. In a short time, however, the editor of the *British Journal of Dental Science* proceeded to Manchester and, by means of personal exertion and the aid of such of his friends in that part of the world as needed protection, succeeded in getting together a very small number of persons, not one of whom occupied a prominent position anywhere, over whom he presided. And thus was publicly inaugurated the cut and dried scheme. When this was erroneously announced as a meeting of

the dentists of Manchester, as every man in that city who held any position was conspicuous by his absence—although the leading men had been importuned by the chairman to attend—this was so strongly objected to that, to avoid a protest from these gentlemen in future reform proceedings, this was called the "Manchester Meeting," a change in name sufficient to silence the Manchester dentists, but which was as misleading as ever, for it implied that reform began in that city, and with the dentists of the North. It is proper, however, to say that the indisposition of a portion of the Manchester dentists to attend the meeting was the manner in which it was got up, and some of these gentlemen afterwards gave in their adhesion to the reform scheme. In time a body called the Reform Committee was organized, to whom was ostensibly entrusted the task of getting through Parliament an act which would compel all dentists then in practice to be registered, and all who came in afterwards to possess some *legal* qualifications. But the real work was done by the little clique with whom the matter originated.

Then commenced an agitation, and we had the spectacle—amusing or otherwise, according to the mood in which we view it—of men, many of whom had become dentists, goodness only knows how, indignant that "unqualified" persons should be allowed to set up practice side by side with them, and actually get some of their patients; of men, many of whom had got into practice by advertising, and had managed to get on the register as qualified, in order to make advertisement of their assumed excellence, shocked to think any man could do so unprofessional a thing; and of men, many of whom do not know the difference between protoplasm and a brickbat, clamoring for an act of Parliament to prevent uneducated persons claiming to be their equals. What was said to the public, and what was urged on the dentists, were distinctly different. While the public were assured the promoters of registration were actuated by the loftiest motives, and were only anxious to provide a superior class of dentists, the arguments addressed to the latter, to give their support, were of the most sordid kind; and it was undisguised that the real object was to *limit the number of dentists*, and to prevent, by a legal enactment which did not reveal the intention, but that could be manipulated for that purpose, the advent of

any more of those finger-skilled Americans whom patients persisted in preferring to the rude amalgam stuffers. What was commonly urged was something like this: "The dentists are increasing quite too fast. There used to be only Mr. So-and-so and myself in our town, now there are twenty odd." This was not unfrequently supplemented by the assertion that the practice, divided among so many, was not anything like what it used to be. Occasionally the fact was revealed that the act was aimed at the Americans, but not often, as this had to be kept as much as possible a secret; for if what the American gentleman who seems to be in the confidence of the reformers so frankly stated, at the meeting of the American Dental Association—that "the passage of the English law was caused by the presence of American graduates in Europe"—had come out in a tangible form before the act was passed, no Parliament would have sanctioned it, for the public know quite too well what they owe to the American dentist. Besides, it can not be too clearly understood in America that if all this little-mindedness was not confined to a small class of Englishmen, England would not be what it is; and that it has no counterpart in, and meets with no sort of sympathy among the upper classes of the country, who, with its intelligent, industrious class, are its real rulers; and it is especially absent with the intelligent and honorable dentists and medical men. A specimen of the monopolist type of medical man was one of a deputation to wait on that tory among the tories, the Duke of Richmond and Gordon, to urge that the penal clause of the new medical act, now before Parliament, should be made more stringent. "Do you mean to ask that a man shall not perform a surgical operation, or prescribe medicine, even without fee, unless he posseses a legal qualification?" asked his grace." "Yes," was the reply. "Then," answered the nobleman, "I fear you will not be able to get any such law." And they will not. The Dentists' Act was obtained because it was supposed to be intended to raise the status of an important body of men. To what extent it has done so, let us determine.

The first thing to observe is, that all matters appertaining to the profession is placed under the control of the Medical Council. This is a legal body composed of twenty-three gentlemen, seventeen of whom represent the seventeen—one to each—medical licensing bodies in the kingdom, and five are nominated by the Queen. To this

body no dentist, as such, need aspire. So we are to be governed in true Oriental style by what is, to us, an irresponsible despotism. This Council is to keep a register of the dentists, determine who shall be on it, and who shall not; what qualifications are necessary, and what foreign diplomas are to be considered good enough to rank with the L. D. S. license. But all dentists in *bone-fide* practice Aug. 1st, 1878 are entitled to registration without any further question After defining the meaning of the special terms used in the act, it proceeds to declare that,—"From and after the first day of August, one thousand eight hundred and seventy-nine, a person shall not be entitled to take or use the name or title of "dentist" (either alone or in combination with any other word or words), or of "dental practitioner," or any name, title, addition, or description implying that he is registered under this Act, or that he is a person specially qualified to practice dentistry, unless he is registered under this Act. Any person who, after the first day of August, one thousand eight hundred and seventy-nine, not being registered under this Act, takes or uses any such name, title, addition or description as aforesaid, shall be liable, on summary conviction, to a fine not exceeding twenty pounds; *provided that nothing in this section shall apply to legally qualified medical practitioners.*"

In the minds of the concoctors of the reform scheme, the legal qualifications of a Physician, Surgeon or Apothecary carry with it, as the greater includes the less, the necessary qualifications of a dentist. The possession of the manipulative skill supposed by ordinary minds to be indispensable to dental surgery, is quite unnecessary for the dentist, provided he be medically educated. One finds it difficult to treat such folly seriously. The working of this section should be carefully noted for another reason. It does not say that no one shall "practice dentistry for fee or reward" as in the New York Act, but no one shall, unless registered, call himself a dentist, or by any title that implies he is registered under the Act, or that he is a person *specially qualified*—that is, holds a legal qualification —to practice dentistry unless he is registered. This clause carefully avoids one of the main objects the concoctors of reform had in view. The wording of the New York Act is what they wanted, but did not get. A man may still practice dentistry, if he does not call himself a dentist, just as a pharmaceutist may prescribe for a customer, if he does not call himself a Surgeon or Physician.

[TO BE CONTINUED.]

EXPERIMENTS WITH ARSENIC.

By J. C. ANDERSON, M. D., Mansfield, Ohio.

Through the kindness of Miss Emily Nunn, lecturer on biology in the Wellesley College, Boston, U. S. A., who has put into my hands her experiments upon the frog (Rana temporaria) with *arsenic*, I am able to present to our readers some hints regarding the structural changes that this drug produces upon the epidermis, as well as its deeper physiological and pathological effects upon living organic structures.

The experiments refer more particularly to the desquamation which this drug is supposed to produce.

"When the flakes of epidermis come away some hours after the administration of the drug are examined, it is found that they can be readily split up into two strata; into a transparent corneous layer, and into the underlying more granular intermediate layer. The peculiar vacuolation of the cell substance in the immediate neighborhood of the nucleus, by which the nucleus is deformed, or at times almost destroyed, was frequently very conspicuous. I may remark that, as far as I could ascertain, the changes leading to the 'vacuolation' begin in the nucleous itself, and I should accordingly be inclined in this point to differ from other writers, and to regard the phenomenon as a degeneration of the nucleous, and not as a change in the cell substance affecting the nucleous in a secondary manner.

"There was no diminution, or at least no marked diminution of the cohesion between the various cells composing the two layers, the corneous and intermediate. The whole corneous layer separated readily from the underlying intermediate, and the desquamation had evidently been caused by a separation of the intermediate layer, with its flattened cells, from the malpighian, with its more or less cubical or polygonal cells; but the constituent cells, both of the corneous layer and of the intermediate layer, held pretty well together; so much so, that I was quite unprepared for the changes which I subsequently observed in the malpighian layer.

"These changes, I studied by means of vertical sections, taken

from different parts of the body, at different intervals after the (hypodermic) introduction of the poison, show that the general effect of the drug on the epidermis, is to cause a degeneration and partial solution of the protoplasm of the cells, whereby, (1) the whole epiderm becomes loosened from the subjacent derm; (2), the cells of the malpighian layer become incoherent, so that the whole layer collapses, and its well known architectural features become obscure and (3), the intermediate layer separates from the malpighian layer below, and at times from the corneous layer above. The corneous and intermediate layers are thus desquamated, sometimes separately, sometimes, and perhaps most frequently, together. In no case—even in those of most extreme or most lengthened poisoning—have I ever seen the malpighian layer actually cast off during life; it always remains attached (though loosely) to the derm. In preparing sections, however, it frequently becomes detached.

"The action of the *Arsenic* is first indicated by the appearance of a faint narrow band (fig. 1. a.) along the bases of the columnar cells, immediately above the basement membrane. This is apparently due to a softening and partial solution of the corresponding part of the protoplasm of the cells; and in many of the sections, holes or spaces (fig. 1. b.), (which appear to be rather rents and tears than vacuoles), make their appearance, partially separating the bases of the cells from the underlying derm.

"Under the continued influence of the poison, this solution, softening or degeneration of the protoplasm of the columnar cells advances, and the spaces increase until (as shown in fig. 2, the cells, instead of being attached to the underlying derm by the whole surfaces of their bases, are connected only by bridles or threads of protoplasm.

"At the same time, a somewhat corresponding softening or solution begins to affect not only the other portions of the protoplasm of the columnar cells, but also the bodies of the rest of the cells of the malpighian layer. The indications of the ridges and prickles become obscured, and the cells lose their characteristic arrangement. I do not think I can better describe the general result, than by saying that the cells seem to collapse and become huddled together. (Fig. 3.) The oval form, and vertical position of the

Fig. 1. Section of epidermis from frog poisoned with arsenic; *a*, narrow light band at base of columnar cells caused by early action of arsenic; *b*, holes or spaces beginning to appear in it.

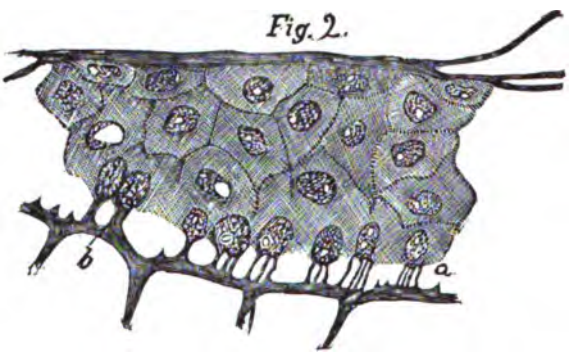

Fig. 2. More advanced action of arsenic. The narrow light band of fig. 1 much widened, and at *a* the protoplasm reduced to fine threads, or, *b*, a single bridle.

Fig. 3. Section from skin of frog three days under arsenic, showing separation of cells and complete breaking up of structure; *a*, deformed nuclei with obscured outline; *b*, large spaces caused by disappearance of isolated cells; *c*, light lines between cells, indicating a solution or softening of protoplasm.

columnar cells, so characteristic of the healthy skin, disappear; the cells of the whole malpighian layer become irregular in outline, and form a diminution of their cell substance; their nuclei appear crowded together. Nor is the change confined to the cell substance; the nuclei also are affected. They lose their characteristic oval (or in the upper cells of the malpighian layer spheroidal), form and become angular and smaller, as if they had shrunken. (Fig. 3, a.) The outlines of the nuclei also become less distinct, as if both nucleus and cell-body were fused in a common degeneration. In this way the whole malpighian layer, so to speak, collapses, losing its natural features, and separating from the derm, to which, however, it remained attached, partly by the bridles spoken of above, but also and chiefly by the prolongations of the epiderm into the ducts of the cutaneous glands.

"It is obvious from the foregoing account, that the *arsenic* first attacks lowermost or innermost portions of the epiderm, and that its action advances from the derm outwards. This may be in part due to the simple fact that the innermost cells are those which are nearest to the blood vessels carrying the poison; but this can hardly be the whole reason, since diffusion must be very rapid through a thin membrane of such a nature as the epidermis.

"It seems more natural to attribute the phenomena to the fact that the cells of the malpighian layer next to the derm (the columnar layer), are composed of more active, more irritable protoplasm than that of the rest of the derm, the irritability diminishing in the series of cells from within outroads, in proportion as the metamorphosis of the protoplasm into keratin becomes more and more pronounced.

"The characteristic vertical arrangement of the undermost cells, *i. e.*, the columnar layer of the epiderm, is a phenomenon for which it is very difficult to account. Embryologically considered, this feature seems to be a continuation of the condition of the primary epiblast, the cells of which are always vertical; but it is difficult to see what purpose is served by the preservation of this ancestral feature. It is obvious, however, from the results which I have given, that this vertical position is maintained (for whatever reason) by some exertion of the protoplasm of the constituent cells. Immediately that the *arsenic* damages the protoplasm, the vertical ar-

rangement is lost; indeed, this is the most obvious effect of the *arsenic*, and the one most readily recognized."

These experiments are of double interest to the homœpathic practitioner, as it verifies the reality of our provings which were made many years ago, as well as to illustrate the true pathological changes the drug is capable of producing.

If we note the destructive action which it exerts specifically upon the protoplasmic structures, we may see plainly why this drug is regarded with so much favor by homœopaths in typhoid and other degenerative types of disease. It was often remarked by my preceptor (Dr. F. Stahl, whose long experience and accurate observations give his utterances considerable weight), that *arsenic* would go farther in search of the ebbing life forces than any other drug.

Again, it is observable how these experiments coincide with our provings in desquamation and eruptive symptoms recorded in our materia medica. I will not take the time or space to record them here, but will advise the reader to turn to his materia medica, and note the striking similarity.

I have not given here the full detail of Miss Nunn's experiments, but sufficient to illustrate the importance of this line of investigation.—[*Cin. Med. Advance.*

PROCEEDINGS OF DENTAL SOCIETIES.

EXTIRPATION OF THE DENTAL PULP, AND ROOT FILLING.

[Read before the Illinois State Dental Society, May, 1879.]

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The history of dental science shows a gradual unfolding of the nature and functions of the dental pulp. Fifty years ago it was little known, and little appreciated. Whenever it was exposed so as to be the cause of pain, and when it was known that the death of the pulp would be followed by immediate relief, to devitalize the pulp in all conditions and degrees of exposure was the dictate of the best wisdom and the soundest practice of the times.

But when microscopy revealed the ramifications of the *vital* tissue throughout the hard structure of the teeth, and its cell-workings in the production of dentine, its functions began to be more highly appreciated, and its persistent workings were declared a necessity to the integrity of the tooth structure; and with equal confidence, its extirpation was declared a mockery of science, and a crime against nature.

The progress from nothing-worth to great, and to greatest-worth created such enthusiasm for its preservation as against extirpation, that therapeutics outran pathology, and arrived at the goal of success with a surprisingly long train of the most doubtful cases reported successfully cured.

According as we understand the structure and functions of the pulp, and the laws that control its workings, and understand the firm and enduring nature of the hard structure which is the product of its workings, will be our treatment of it in all cases when treatment is needed.

If from any mistaken view of the importance of the pulp we have sought to save it alive in the moment of its impending death, it can scarcely be called erring on the right side, if we consider the supervening results. It might be better in certain cases to cast out the Jonah of a living pulp to save in the best condition what remains.

A few years ago in my study of the formative organ of tooth tissue, I arrived at the conclusion that the dental pulp is variable in its functions, and wholly peculiar in its workings; and that the hard structure which it builds, usually regarded peculiar, *is* peculiar in a more important sense than is usually considered. I came to the conclusion that the pulp is not at all periods in the life of an individual of equal importance as related to the other tooth tissues, and that the argument for the preservation of the pulp, based on its necessity as an organ of nutrition, is only applicable to the earlier periods of life, and that it it ever has a nutritive function as regards the hard tissue, it wholly ceases in after-life throughout the larger area of the tooth structure—that the generally received opinion that the hard tissue of the teeth is amenable to the law of waste and replacement of its elements is based wholly on analogy, and is without other foundation. On the other hand I consider the fact that it is *not* subject to the general law of organic structures in regard to waste and nutrition constitutes the *chief peculiarity* of fully formed dentine.

I therefore came to the conclusion that the loss of the pulp is not, in all cases, so damaging as the profession are wont to believe; and that there are numerous cases in which it is far better for the permanency of the remaining tooth structure to extirpate the pulp at once than to attempt by long-continued doubtful means to save it alive.

I shall, therefore, *assume* in the presentation of this paper that there are cases where extirpation is indicated,'and it will be my purpose to point out the best method, then to explain my method of filling the more difficult class of root canals thus made vacant.

Extirpation of the pulp, the first branch of my subject, has not, I am confident, gained sufficiently the attention of the dental profession. The reason may possibly be found in the disfavor with which the profession have regarded the operation. Those who have occasionally found in their practice cases which, in their view, demanded extirpation, have been cautious of mentioning the fact, lest they should be thought not to have caught the spirit of the age, and to be so far behind the progressionists that they might lose caste with the more advanced of the profession. Hence that improvement which may be found in a comparison of ideas and

modes of practice has not been apparent as regards this subject. Since the high-sounding notes, peal upon peal, of progress in the direction of pulp preservation have been rung in all true professional ears, this subject has seemed to many scarcely worthy of attention. The result is that old ways and methods, which were bad ways and methods, have been practiced in comparative secrecy, greatly to the detriment of dental practice, and damaging to those who have been the subjects.

When devitalization of the pulp was a more acceptable practice than it has been in later years, the term *devitalization* seemed comprehensive of nearly, or quite, the whole operation; and all discussion of methods began, progressed and ended with the *agents* employed and the *time* occupied to effect devitalization.

We have listened long to the discussion of how little or how much arsenic is needed? How little or how much time is required for its action? How to render the pulp insensible to its irritating and painful effects? and to a comparison of the virtues of cobalt and arsenic; and in all the discussions the method of devitaliztion was the question of cheif concern.

It is quite surprising to us now, that so many teeth were so kindly cared for by nature after devitalization, to protect them from the usual result of alveolar abscess. While the profession of to-day is far more enlightened concerning the etiology and pathology of dental diseases and the requirements in any case, the old term *devitalization* is still much in use, and should be abandoned as too suggestive of the very inadequate methods and false ideas of former times, with respect to a very important and difficult operation in dental surgery.

The word which I have employed as the title of this branch of my subject gives us the full rounded idea of what is to be accomplished, viz.: *extirpation;* which means to root out, to eradicate, to wholly get rid of, to expel.

With this idea in mind, the work of the dentist is scarcely begun when devitalization of the pulp is accomplished; for he is required to remove every vestige of the tissue from the pulp chamber and from the root canals. Devitalization is a simple process, which few, if any, have difficulty in effecting, except in a few morbid cases. But extirpation is quite another operation, and in many of the teeth

is attended with very great difficulty; so great that it is undoubtedly true that the number of operators who accomplish it with certainty in the molar teeth, and in many of the bicuspids, is very small. Yet, with our present knowledge of the requirements of the case, successful treatment depends upon the *thoroughness* of the extirpation of the pulp. It is not the place for guess work and blind uncertainty; for safety depends on the certainty and completeness of the removal of the pulp tissue. How shall this be accomplished?

The general practice of the profession is sufficient warrant for the use of arsenious acid in the first step in the process, viz: devitalization. But all should be aware that this is an all-powerful agent, and should be used with the utmost caution to prevent contact with other vital tissues than the pulp. I think nothing in the history of its use can indicate the exact quantity required to effect devitalization of a living pulp. But we do know this, that a quantity very minute has, in multitudes of cases, accomplished the purpose.

When the arsenic is applied the cavity should be carefully sealed up, so as to prevent any possible escape and action upon surrounding tissues. As a cover, I use a thick solution of gum sandarach or gum shellac on a bit of cotton. From six to twenty-four hours is sufficient time in most cases to effect divitalization—the length of time depending on the extent of the exposure and the completeness of the contact of the paste with the pulp tissue. If the cavity of decay is in the posterior wall of a molar near the gum, rather than run the risk, which is very great, of damaging the root membrane by applying the arsenic in such a locality, I seal up the cavity with gum shellac and drill a new opening through the grinding face of the tooth. Too much caution cannot be used in preserving from injury the peridentium and the parietes of the alveolus, on which the future life and usefulness of the tooth must depend.

After devitalization, the next step is to secure direct and easy access to the root canals. Neglect in this particular is always unwise. In the anterior teeth it is best, in a large number of cases to drill in through the palatine bevel of the crown. If the decay is in the grinding surface of a molar, the opening should be enlarged with a corundum point in the engine, or by other means, to such size as will permit a full view of the entrance to the root canals. In case

the cavity of decay opens posteriorly in a molar, the engine should be used to cut through the posterior angle of the crown and far enough anteriorly across the grinding surface (certainly as far as the centre), for the special purpose of getting an entrance by direct line into the roots. Thus the operator can *see* as well as *feel* his way, and know better the difficulties of his undertaking.

The next step is the removal of the devitalized tissue. In the straight round roots of the anterior teeth, this operation is so common, and attended with so little difficulty after direct access has been gained, that it is not necessary to suggest any special modes of operating in the roots of these teeth. I am well aware that many dentists confine their root operations to this class of teeth, and therefore they never encounter the difficulties which it has been my study to overcome. The molars are the most important teeth in the mouth, and due consideration of their importance demands that especial attention be given to their preservation.

Let us surround our case with difficulties—a case taken from among the worst. Suppose it to be a second superior molar in the mouth of a patient twenty-five years of age, with firm and healthy dental organization, the cavity opening posteriorly and near the gum; the third molar in position. This case presents a complication of difficulties.

In a case with such surroundings, it may be necessary, in gaining direct access to the pulp chamber, to cut across the crown, beyond the central sulcus, even to the anterior angle.

Bearing in mind now that the operation contemplated is a complete and thorough removal of the contents of the pulp chamber and of the three roots, I crave your attention while you follow me step by step.

It is not difficult to empty the pulp chamber and the palatine root of their contents; we will pass therefore to the buccal roots. It is quite impossible with ordinary instruments to enter these roots, except for a very short distance. In very rare instances, and in the mouths of young persons, the posterior buccal root may be entered far enough to lay hold of, and remove bodily, the entire pulp tissue. But this is so rare that it need not be anticipated at all in the mouth of an adult. The anterior buccal root is *still more* difficult of entrance, and to operate successfully in this root is to be in possession

of sufficient skill to insure a satisfactory operation for entire pulp removal.

I have found the barbed nerve broaches wholly impracticable for removing the tissue from the extreme portions of the root, the barbs acting as a hindrance rather than a help. The drills manufactured for the purpose of enlarging the root canals are so large or so wanting in flexibility as to cut through into the alveolus of a very flat root, or so badly-tempered as to be quite certain to break off in the root. In this complication of difficulties, some have resorted to chemical agents to put the fragments of nerve tissue remaining in the root in solution. Pepsin, potash and soda have been resorted to, but with very unsatisfactory results.

After removing the arsenical paste, my practice is to wash the cavity with dialyzed iron, for the purpose of neutralizing the effect of any remaining portions of arsenic, which. being otherwise washed out, might come in contact with the root membrane at the neck of the tooth, and be a source of great danger to the future health of the tooth. The dialyzed iron unites chemically with the arsenic and renders it harmless. To preserve the root membrane from harm should be a matter of as much concern as the complete extirpation of the pulp.

After application of the iron, I remove the soft tissue from the pulp chamber and all from the roots that can be readily reached. I then dismiss my patient, without applying creosote or other antiseptic which might prevent decomposition, leaving only loose, dry cotton in the cavity. It must be remembered that after devitalization there will be a sloughing and decomposition of all remaining fragments left in contact with the vital portion at the apex of the root, and a healing of the living portion at the point of sloughing off of the dead. These processes require time, and the briefest time possible is the best. To secure this rapid sloughing and decomposition, I instruct my patient to replace in the cavity twice a day fresh cotton, washing out also with warm water at each removal of the cotton. This treatment should last from three to four days to a week. Then I give myself ample time to explore the roots. But it seems to me vain to direct one to do this without describing the instruments with which it is to be done. The profession have had too much advice as to what *ought* to be done, without making

apparent any possible *method of doing* what is most instructively advised.

Any one who has attempted to remove wholly and thoroughly all the soft tissue from the flattened and bent roots of the superior molars knows how inadequate are most of the instruments at hand for accomplishing it. The difficulties are so great that many a conscientious operator gives up in despair, hoping that kind Nature will relieve him from the mortification of witnessing future unfavorable results.

For nerve and root instruments generally, I purchase jeweler's broaches. These are cheap, and with a little ingenuity can be made to serve every needed purpose. They are hexagonal in form, and from the size of a hair to any larger size that may be required. They are too hard and brittle for safe use without drawing the temper. To do this without injuring the quality of the steel is a very careful operation. Before heating, the instrument should be coated with soap or glutinous oil, to protect it from rapid oxidation while heating.

Where one has a hot stove in the room—not red-hot—a stiff spring temper may be obtained by placing delicate hair broaches on top of the stove, then very soon grasping them with the tweezers and lifting them up *very slowly* through the hot air to the cool air above. Boiling in tallow will also give an excellent spring temper. To reduce the temper to perfect softness, and render the instrument very flexible and tough, do not thrust it into the flame of a spirit lamp. You are quite certain to fail in what you attempt in this way, and quite as certain to spoil the steel.

A better method is to coat the instruments, as before directed then take a shovel full of glowing embers from the stove, and thrust the instruments well into the embers, to remain there until cold. For the formation of a hook on the point of a delicate instrument, I take a spring-tempered broach, warm it, and rub it on a bar of soap, or, to avoid the danger of over-heating, moisten the soap and rub it on the instrument; then heat an old bench file or small bar of iron to a red heat, and lay the end of the broach on it, to remain till the iron bar has cooled.

To bend the hook, bevel off the handle of a separating file, not quite to a cutting edge, place the broach against the flat side of the

file handle, and holding it there firmly with pliers, bend the point of the broach down against the bevel.

A flat instrument is needed. This I make by filing into the flat form a spring-tempered broach of such size as I deem suitable; it may be very thin, while its width will give the requisite stiffness, and it will enter most of the flattened roots. With these instruments I begin my work of emptying the root canals.

First, take a straight hair-like spring-tempered broach and pass it up to the apex, rotating if necessary to enlarge it, to learn if there remains yet any living portion of the nerve tissue, remembering that all sensation of pain is not evidence of vital tissue in the root canal. If the devitalized tissue has not yet sloughed, touching it with the instrument will cause pain at the moment of contact, which will cease when the instrument is withdrawn. If a living portion of nerve tissue remains in the canal, the pain will be likely to continue. But I do not deem it advisable again to apply the arsenious acid. I ream out the passage into the root with small, then larger broaches, until a small hooked broach will enter; then I employ a local anæsthetic, compounded of equal parts of chloroform, tincture of aconite-root and alcohol, to obtund sensibility of the tissue, when it can in most cases be removed without serious pain. If I cannot lay hold of it with a hook and remove it wholly at once, I, with the same or another instrument, break up the tissue and thus destroy its vitality; and after removing such fragments as I can, I leave the remaining particles for several days to decompose, cleansing the cavity from time to time with water and wiping out with fresh cotton. This operation must not be hastened. *Time* is needed to secure a total solution of dead tissue. When the tissue is broken up mechanically we can never be *sure* of removing all by simple mechanical means. Hence, I insist most strenuously on giving time for chemical decomposition as the only certain mode of wholly ridding the pulp canal of every vestige of organic substance. The certainty of success depends upon this *thoroughness*.

Let us now consider the operation of filling. Any root that will permit the passage of a broach of any size through the canal to the apex is in condition to fill, needing only to enlarge the entrance to the root, so as not to consume too much time in repeated efforts to find it. The broach should pass readily in and out.

The difficulty of the extirpation of the pulp is only second to the difficulty of filling the roots in the molar teeth. All agree that certainty of success can only be gained by filling the root canals thoroughly with some impervious and insoluble material; and the absolute necessity in the case is that the canal shall be completely closed at the apex. It is not ordinarily difficult to fill that half nearest the pulp chamber. But this is of comparatively little importance when the apical end of the canal is thoroughly filled. It is therefore evident that any method of filling which does not with certainty reach the apex is defective, and that which offers the fairest certainty of doing this is the best.

Will the filling materials in general use, with the method of using them, accomplish the purpose in the class of roots we are now considering?

While gold and tin may be successfully manipulated in the round straight roots and in some of the bicuspids, I consider it an impossibility to fill with these metals the flattened and curved roots of the molars.

Oxy-chloride has been favorably considered as a filling material for roots of all classes. This, too, may serve well enough in roots which can be readily entered and rapidly filled. But to have it of such consistency as to render it, when hardened, insoluble and impervious, it hardens too quickly for an operation where time is one of the elements of success, and, besides, it has such an affinity for the tooth bone, that the canal is liable to be clogged a short distance from the entrance before the more remote portion of the canal is filled.

A solution of gutta-percha in chloroform has been used with undoubted success in many cases. I consider it objectionable in two very important particulars. By its tenacious consistency it will stretch across the mouth of the canal, and the enclosed air will prevent its entrance into the roots. I do not consider experiments with it in filling roots of teeth out of the mouth reliable tests of its adaptability. In such cases the apical foramen is open to permit the confined air to escape, and give place to the chloroform solution. If an effort be made to expel it by force, the rapid evaporation of the chloroform leaves you a stiff, sticky material to manipulate, which is speedily beyond the operator's control. There is also the same dif-

ficulty in expelling the air when oxy-chloride is used. *Any* fluid holding in solution solid material of any kind, and of such consistency as to form an impervious filling, will stretch itself across the narrow openings to molar roots, and prevent the escape of confined air, and consequently the entrance of the fluid into the roots. Here let me say, that of impermeable materials I consider that it matters not what is used. The only question in relation to each regards the practicability of its use in making the operation of root filling a certainty in the difficult class of roots we are now considering.

I have but one other preparation to name, and that is an alcoholic solution of such gums as shellac, mastic, or copal. This solution is not new for the purpose of root filling. But the ordinary method of using it is open to the same objection as that already made against oxy-chloride and the gutta-percha solution. My early experience with it was attended with the same unsatisfactory results as with other materials. My method of manipulating the gum for a few years past has brought me to the most satisfactory results that I have ever obtained in filling molar roots.

Having gained visual as well as mechanical access to the root in the manner already described, I prepare my gum in a creamy consistency, adding a small quantity of that strong antiseptic, salicylic acid, which readily dissolves in alcohol.

I select a broach of suitable size to pass to the end of the root freely, it matters not how small, and, clipping off the sharp end and rendering it smooth, I dip it into the solution and pass it carefully up the root to the end. This I do again and again. Every time the instrument passes up, it expels a portion of contained air, and leaves also a portion of gum which was adhering to it. However minute that portion of gum may be, each successive plunge of the instrument adds to it, expelling, at the same time, the air to give place to it. A pool of the gum solution may be formed in the pulp chamber, not with the anticipation that capillary attraction or gravity will carry it to the terminal end of the canal in spite of the law of pneumatics, or that a little agitation with a cotton swab will do it. But, having a pool of solution through which the instrument passes in and out with a portion of the gum adhering to it, the rapid churning process must at length expel all the air, and fill with gum to completion the entire length of the root.

Do not be afraid of wasting time in this operation. It is time and patience that conquers. Up to this point the rubber dam must be in place to keep the cavity dry. When you feel quite certain that the gum has filled the root, add a drop of water to the cavity. The alcohol, having a greater affinity for the water than for the gum, will leave the gum a firm deposit in the root canal, and unite with the water. This process takes a little time also. You will recognize the firm deposit by the increasing difficulty in passing the broach into the canal. Wipe the cavity as dry as possible with bibulous paper, and give a little time for evaporation; then, when dry, repeat the operation with the gum, and wiping out all the superfluous gum, leave the cavity for a short time for the evaporation of the alcohol. In the meantime the filling material may be prepared, in case it should be advisable to fill at the same sitting. If no unfavorable conditions of the peridental membrane have attended the previous treatment, I have found no unfavorable symptoms following an immediate filling. If unfavorable indications have attended the operation, I deem it wise to dismiss my patient for a few days or a week, then treat the cavity with a solution of salicylic acid in alcohol before filling.

I am constrained to say, *do not hurry*. It is better to wait for two weeks after the tooth is considered ready for filling, than to hurry the whole operation through in a few days. Success is born of *thorough manipulation* and *time*.

DISCUSSION.

DR. TALBOT: Objects to the statement that the pulp is not essential to the vitality of the tooth. A prominent doctor has a hobby that the spleen is not an essential organ of the body. This man happened to have an opportunity of removing a spleen, which he accomplished successfully. On asking his assistant next morning how the patient prospered, he replied, "Oh, he is dead!" If the pulp were not necessary to the tooth it would not be placed there. The essayist's remarks are very forcible, and his theory very correct and instructive; when, however, he attempts to demonstrate the theory by employing an inert substance to effect a chemical action, he immediately makes a chemical operation of it. Extirpation can

not always be made a successful mechanical operation, and it is not essential that every particle should be removed. We can safely depend upon the chemical action of disinfectants and antiseptics to remove or destroy the products of decomposition, and to preserve (mummify) and render harmless the small remains of tissue which cannot be reached for removal. Sulphuretted hydrogen, phosphoretted hydrogen, and ammonia gases are the products of all animal decomposition. This is nature's chemical laboratory—nature's method of getting rid of foul substances, by reducing them to their ultimate elements. The sulphuretted hydrogen in the sewer can be compared with the same gas that accumulates in the pulp chamber and root canals in the tooth. If it cannot escape through the street opening, it will, owing to its elasticity and expansion, be forced into our houses; likewise with the gas that arises in the tooth. Were we to plug up the cavity of decay with an impervious filling, and thus prevent the escape of the gas into the mouth, it would pass through the apex of the root into the tissues, causing inflammation and abscess. Should we not use chemicals, and thereby disinfect and prevent the formation of gases before filling? Professor Haines, when asked how to detect sewer gas in houses, suggested that strips of paper, saturated with acetate of lead, be hung in a room supposed to contain the gas. If sulphuretted hydrogen were present, the paper would turn black, caused by the chemical action, thus: $H_2S + Pb_2C_2H_3O_2 = PbS + 2HC_2H_3O_2$ sulphide of lead and two atoms of acetic acid are formed. Acetate of lead was therefore used to prove Dr. Talbot's experiments. A substance, to be a disinfectant, must, when combined with a foul material, form two compounds entirely unlike the originals. An antiseptic is a substance which will coagulate albumen, thus preventing decomposition and the formation of gases. Carbolic acid is a powerful antiseptic. It requires but two per cent. to destroy the lower forms of animal life; but it is not a disinfectant, does not enter into chemical union with gases, consequently does not answer for a permanent filling with cotton, as it was formerly used. The material which best serves our purpose is oxy-chloride of zinc; it is both an antiseptic and a disinfectant. It also acts mechanically, by perfectly adapting itself to the walls of the canal wherever it can be forced, producing results not attainable with any other material.

If sulphuretted hydrogen be brought into contact with the oxide of zinc, chemical change immediately takes place, thus: $H_2S + Zn O = Zn S + H_2O$. We no longer have sulphuretted hydrogen and oxide of zinc, but sulphide of zinc and water, both inert substances. Again, bring sulphuretted hydrogen and ammonia gas in contact with chloride of zinc, chemical change takes place, thus: $H_2S + {}_2NH_3 + Zn Cl_2 = Zn S + {}_2NH_4Cl$. Sulphide of zinc and the chloride of ammonia is obtained, at the same time the antiseptic properties of the chloride of zinc prevent further decomposition. Dr. Talbot, having the necessary materials with him, performed some very interesting experiments to illustrate the formulas upon the board, also the coagulation of albumen with chloride of zinc and carbolic acid, and proved conclusively that carbolic acid is not a disinfectant. Has a number of times filled roots having abscess at once with oxy-chloride of zinc, and treated the abscess afterwards locally through the fistula. This will often do well in young and healthy persons. There will be very little gas formed in minute buccal roots of molars, and the gas that does form will be immediately destroyed if chloride of zinc be forced into the canal with a very fine nerve broach. It is both difficult and troublesome to use oxy-chloride of zinc, but not more so than the mechanical manipulation described by Dr. Ingersoll.

DR. BLACK: The subject has been pretty thoroughly discussed in the paper and by Dr. Talbot, and not very much is left to be said. Dr. Ingersoll and Dr. Talbot are both right. Neither plan will succeed in *every* case if the apical foramen is not stopped. We may disinfect, but the disinfectant will only do so much work. After it is gone trouble may recur, and we must come back for certainty to the stopping of the end of the root. Every man will find his own best way of doing it. I use gold whenever I can be sure of getting there. Sometimes use oxy-chloride of zinc. Removing pulps from young teeth should be done with reluctance, and only when unavoidable. It may be done for persons of twenty-five years or more with good prospect, but at twelve or fourteen years it is a very different thing. A great deal more trouble and effort ought to be bestowed for saving a pulp for a young patient. A young tooth is *very much* more likely to break down after extirpation than an older one. Am not well satisfied just what the dif-

ference is in the character and condition of the tissues, but am satisfied there is a great difference in results.

Some one asked Dr. Black if he tried to save portions of the pulp, if he could not save all of it, or to save it in one root after it is dead in another. No.

Dr. INGERSOLL said he once stood where Dr. Talbot stands now, and had used the expression that if the watery portion were removed the remainder might be *embalmed* by an antiseptic, but has found that embalming is not a success since the days of the ancient Egyptains. Antiseptics are, after a while, worn out, and then trouble may recur. The method described in the essay does depend upon chemical decomposition, but we drag away all we can mechanically to hasten the process. If the cavity is left open for the gases and fluids to escape, no antiseptics or disinfectants are needed. This must be waited for till every particle of tissue is converted into gas or fluid. The fine buccal roots of molars sometimes cannot be entered with the smallest winding of cotton, but the broach moistened with gum solution will go where the dry broach went before, and unlimited time can be used. The hexagonal broaches will ream out a fine or tortuous canal somewhat, and a slight turn in the broach near the point will enable it to follow the windings of a considerably tortuous canal, and in a boot-shaped canal a broach carried to the heel will often *churn* the material forward to the toe.

Dr. CUSHING: Dr. Ingersoll's method of using shellac applies equally to the use of chloroform solution of gutta-percha, or oxychloride of zinc; both may be carried to the same point, in the same way, by using them fluid enough. The cavity should first be saturated with chloroform or chloride of zinc solution before beginning to use the mixture.

Dr. BROPHY: Dr. Ingersoll, in the paper, used the buccal roots of upper molars to illustrate the most difficult operations of pulp extirpation and root filling; but believe myself that the roots of lower molars are the most difficult ones in the mouth to treat, and if there should be subsequent trouble, the more cancellous nature of the upper jaw makes the trouble less serious than in the denser bone of the under jaw. In cases of pulp extirpation with posterior cavity near the gum, do not like to cut to the crown and half way or more through it, because it destroys the strength of the tooth

and makes it liable to break down under the forces of mastication. Prefer to reach the anterior buccal root by making an opening through anterior proximal face. The dialyzed iron is an excellent thing to use in the cavity after the removal of an arsenic application. Oxy-chloride of zinc can be introduced into any root where anything can be. The solution of chloride of zinc should be mixed with about half water to retard the setting. *Can* make it so that it will not set for fifteen minutes. In very fine canals, after removing what can be got out, would coagulate the remaining albumen with chloride of zinc or Labarraque's solution, and do not believe that if it has once hardened it will ever become decomposed. Dr. Brophy described the method of *churning* the material into fine canals.

DR. DE CROW asked if the chloiide of zinc would not sometimes go through the foramen, and what would be the result?

DR. BROPHY: Yes; and it would cause periosteal inflammation. Dr. B. mentioned a case in which a dead body was injected through the arteries with chloride of zinc, and was completely preserved though the tissues became very much contracted.

DR. CUSHING asked if coagulated albumen would never decompose?

DR. BROPHY thought not.

DR. BLACK: There is a difference in condition between an embalmed body and the remains of pulp tissue coagulated in a root. Moisture and heat are agents of putrefaction. It is probable that the mummies of Egypt would not have been preserved in a moister air and have not much confidence in the prevention of putrefaction in roots permanently, for a life-time, even by oxy-chloride of zinc, in conditions of moisture and heat so favorable to putrefaction. Dr. Black then showed by an experiment the inky blackness that may be produced by the action of sulphuretted hydrogen and ammonia upon an acid solution of iron, and described the process of blackening that sometimes goes on in a dead tooth, putrefaction of the pulp liberating the iron in the blood which it contained, and furnishing the gases to blacken and precipitate it. These gases will sometimes drive out everything else from the tubuli and pulp canals, leaving them, as we sometimes find them on opening, dry. After a while putrefaction entirely ceases; the cavity is no longer emptied by the pressure of the gases, and becomes infiltrated with serum through

the end of the root; then putrefaction again takes place, and another slight deposit of iron salts is made, and this process may be repeated till the tubuli are entirely filled up with these black salts of iron. As to filling with *any* solution, there are none of them that will not shrink. Likes oxy-chloride of zinc, and uses it; but does not rely upon any antisceptic effect, except for a short time, then it will be only an inert mass, valuable in proportion as it completely occupies all the space.

DR. BROPHY: If the oxy-chloride remains there, how can it cease to be a disinfectant?

DR. BLACK: It will so act only till its affinities are satisfied, and if the conditions are such as to require continued disinfection, it would soon cease to be useful.

DR. SWAIN: If in anything we need to be eclectic in practice, it is in filling roots. In any root which can be reamed out, as described, gutta-percha is the easiest and surest. Gold foil is the worst. In such places it is almost impossible to pack it closely enough to prevent the infiltration of fluids, as the offensiveness of many such root fillings that had to be removed abundantly testifies. Dr. Morrison's way, with pure gold wire, is excellent in accessible roots. Uses Hill's stopping in many cases, by warming and rolling in the fingers almost as fine as a thread, cutting in pieces, and pushing with a warm iustrument (a broken Glidden's drill). It can be pushed much farther than the instrument will go.

Dr. TOWNSEND has never seen a case of poisoning of the gum by arsenic. Always applies rubber-dam, and in proximal cavities builds up near the gum with gutta-percha before applying the arsenic. Has filled roots with gutta-percha in the manner described by Dr. Swain for twelve or thirteen years.

"CAN you tell me," asked a pert youth of thirteen, of a dentist out of whose chair he had tumbled, and was shaking himself out and smoothing himself down, much like a Bantam cock who had just emerged from a hard-fought battle—"Why dentists are such melancholy people?" "I really do not know," blandly replied the doctor. "Because," answered the hopeful, as he bolted out of the door, "they are always looking down in the mouth."

MASSACHUSETTS DENTAL SOCIETY.

The annual meeting of the Massachusetts Dental Society was held December 11 and 12, at 13 Pemberton Square, Boston, the President, Dr. L. D. Shepard, in the chair.

The regular order of business took place, after which Dr. C G. Davis, of New Bedford, delivered the annual address. Subject—"Hash of Cold Pieces with a New Dressing."

ESSAYISTS.

Dr. J. H. Kidder, Lowell. Subject: "Crystal Gold, and Some Methods of Using It."

Dr. D. M. Clapp, Boston. Subject: "Short Notes."

The Waters resolutions were unanimously adopted.

The following officers for 1880 were elected:

President—Dr. C. G. Davis, New Bedford. Vice Presidents—1st, Dr. Geo. F. Waters, Boston; 2d, Dr. C. H. Osgood, Boston. Secretary—Dr. W. E. Page, Charlestown, Boston. Treasurer—Dr. E. Page, Charlestown, Boston. Librarian—Dr. F. M. Robinson, Boston. Microscopist—Dr. R. R. Andrews, Cambridge. Orator – Dr. A. M. Dudley, Salem.

Executive Committee—Dr. D. M. Clapp, Boston; Dr. R. R. Andrews, Cambridge; Dr. H. C. Meriam, Salem; Dr. Charles Wilson, Boston; Dr. D. G. Harrington, Boston.

W. E. PAGE, D. M. D., Secretary.

ABSCESS OF THE ANTRUM.—At a meeting of the Harveian Society of London on Feb. 20th 1879, Mr. Lennox Browne read a communication ("Brit. Med. Jour.") on this subject, saying like much other local disease, it might depend upon general conditions. An offensive discharge from one nostril was the sole evidence of disease in a case of ten month's standing. On douching, pus came from the left nostril. A tooth had been removed ten months before; an opening was therefore made through the socket. Through this injections were made but without much result. At last the galvano-cautery was used and then cure was attained.

The extraction of an eyetooth is not always successful in curing a case. Abscess of the antrum is, at times, an unsuspected cause of ozæna.

PLASTIC FILLINGS.

BY HENRY S. CHASE, D.D.S., M.D., St. Louis.

It is now about four years since I commenced the use of plastic fillings to any considerable extent.

In 1875 I placed in the teeth about nine hundred fillings of Fletcher's Gold and Platina Alloy. In the year 1876, 1877, 1878, and 1879, I have placed in the teeth about four thousand fillings of Stanous Gold, and five hundred fillings of Plastic Tin. In 1878 I placed about fifty fillings of Agate, and Acme Cements. In 1878 and 1879 I have placed about two hundred fillings of Fletcher's Porcelain.

I have very few transient patients, ninety-five per cent. of these fillings were placed in the teeth of my regular families. I am in the habit of seeing my patients once in six months or twelve months. Very few defer their visits, for examination, longer than this. The Plastic fillings then have been brought under my inspection many times. I am satisfied that the teeth in which these fillings have been inserted are in a much better condition than they would have been had their cavities been filled with gold by the best of operators.

Fletcher's Porcelain has been used mostly for cavities whose fillings would be exposed to sight. I am delighted with the results. It is said that the "Porcelain" is an oxy-phosphate of zinc. "Weston's Cement," "Poulson's Cement," and "Flagg's Enamel" are all said to be "oxy-phosphates of zinc." I have had no extended experience with any of these cements excepting Fletcher's Porcelain. I have lately experimented a little with "Flagg's Enamel." This sets very quickly; I think in one third the time that the "Porcelain" does and becomes hard enough for mastication in ten minutes. "Flagg's Enamel" annoyed me by its quick setting until I learned by accident how to prevent it.

This can be done by keeping the cement very cold until placed in the tooth. Heat hastens the hardening and cold delays it. The same effect is also produced on the "Setting" of Amalgams. I cool a porcelain slab, or small plate with cold water before mixing my cement upon it. Dr. Flagg claims that the "quick setters" are the best cements, and will last in the mouth much longer than the "slow setters." But a quick setting cement which is delayed in its action

by cold is not at all impaired in its value as a filling. I find that all these cements adhere closely to the dentine, if the cavity is very dry when filled. I find, also, that not the least decay takes place *under* the cements. Four years ago I built up whole palatal walls for the right upper central incisor, with "Fletcher's Enamel." There was absolutely nothing left of the crown of this tooth but the labial wall, a thin slab of enamel and dentine. Two weeks ago I rebuilt the palatal wall, and I hope it may stand four years longer, although the first time I placed the labial wall I predicted an existence of the tooth of only one year. I tell my patients that they must expect to have the *surfaces* of these cement fillings renewed once in two years; but in very rare cases will the filling have to be wholly removed. If a gold or other metallic filling fails, it is generally owing to decay under the plug. When the cavity is refilled the decay must be removed. After three or four refillings the tooth is about "used up". Cement fillings have this great advantage: they preserve the dentine of the tooth perfectly and if the filling has to be renewed the tooth does not suffer by it. To insert a gold plug properly often necessitates the cutting away of sound dentine. Plastic fillings rarely demand this. I often am enabled to color the cement, which I use in an exposed cavity, so that it matches the shade of the enamel. My patients much prefer a filling which will not be conspicious like gold. They also like the short operations, and the easy operations, which plastic fillings insure. They do not in the least object to a "bill" less in amount than formally.

Amalgams are used by most all the dentists in the United States; but few operators, comparatively, are using the "oxy-phosphates." But they are being experimented with by a large number of sensible and honest men, who will, after a sufficient experience, tell us what they think of them. As for myself, I have abandoned gold as a filling, and could not be induced to "go back to the old way."

My experience with amalgam leads me to think that too much quicksilver is generally used in amalgamation. If one will place in the palm of the hand the mercury and the alloy, together with a teaspoonful of alcohol, and manipulate all together, it will be found that considerable oxide of tin will stain the alcohol. This should be washed away two or three times, and it will be found that

thereby less mercury will make a plastic than without the washing. I think it better for the operator to get accustomed to one or two good alloys instead of continually trying new ones. He should test that which he uses in glass tubes and red ink occasionally, to be sure that a filling of it will not contract after hardening, so as to allow of leakage.

The oxy-phosphates are all better for being kept dry some time after insertion. As soon as I insert one of these fillings and remove the surplus, I varnish the plug with a varnish composed of sulphuric ether and copal gum. These two things can be obtained at any country drug store. The copal will very readily dissolve in the ether, and an ounce of it will cost no more than ten cents. The air syringe will dry the varnished plug instantly. The varnish should be allowed to remain until worn off; this will keep the cement dry for three or four hours, probably.

ON SEPARATING TEETH.

By J. H. KYAN, Esq., L. D. S., England.

If there are any practitioners who still use india rubber for separating teeth as a preliminary to stopping, let me advise them to discontinue doing so, and employ cotton wool instead. India rubber acts too rapidly, and sets up an amount of inflammation in the roots which renders the operation of stopping exceeding'y painful. Cotton, on the contrary, acts slowly, but quite as effectively, and does not, as a rule, occasion the slightest inflammation. The method I employ of introducing the cotton, so as to operate efficiently, was discovered quite by accident, and I detail it with pleasure, as I feel confident that it will be found of great use to those unacquainted with the power of expanding when moistened, which dry cotton possesses.

Suppose the object to be to separate the superior centrals so as to expose to view the approximal surfaces (too close together to enable the decay to be seen), take a tuft of dry cotton aud pull it in pieces, so as to bring the fibres parallel with each other. Reduce one end of the tuft of cotton to a thread by twisting it between the finger and thumb, and leave the other end bushy and

thick. The thread can easily be passed between the closest teeth, and the thick end being inside the mouth at the back of the teeth, the thread must be drawn forwards out of the mouth, and for this purpose it should be seized hold of by a small pair of very fine pliers, or, better still, a pair of what are called dental trephining forceps, by turning which, the thread is wound round the nose of the pliers or forceps, and forming a soft protection to the enamel from contact with the steel of the instrument, at the same time gradually separates the teeth with a power which has scarcely any limit, and must therefore be exercised with discretion. The point at which to stop must be when there is no pain, but only a feeling of discomfort. The ends of the cotton tuft may then be cut off pretty close to the enamel by means of a pair of curved scissors.

In the course of a few hours, when the cotton has become wetted by the moisture of the mouth, the teeth will have separated to a degree quite beyond expectation. To prevent the closing up of the space during the operation of stopping, when, of course, the cotton has to be removed, a small wedge of wood must be inserted between the teeth as close up to the gum as possible, so as to be out of the way, and the end can be cut off close to the teeth with a pair of nippers. The wedge must be carefully removed after the operation is completed, and the teeth will close together far more rapidly than they consented to separate.

To many of your readers who have favorite devices of their own for accomplishing the object which I have described, my remarks will appear valueless, but there will be some, no doubt, who will find them of use, and they are welcome.—[*British Journal of Dental Science.*

ON THE SENSIBILITY OF DENTINE.

ASSOCIATION OF SURGEONS PRACTISING DENTAL SURGERY.

[November, 1879.]

The President, S. J. A. Salter, F. R. S., called the attention of the society to some physiological questions relating to the sensibility of dentine, and illustrated his remarks by diagrams. The points enforced were that the dentine is to a great extent endowed with sensibility by its connection with the nerves of the pulp, but

not wholly so, for areas of exposed dentine are sometimes found acutely painful, when touched by steel instruments, in which the tooth pulp has entirely perished. In such cases the connection of the sensitive dentine with the sensorium must be through the nerves of the periosteum, and he believed that such a nervous connection always exists. Furthermore, in some instances in which there was sensitive dentine, and the pulp still remained quick and alive, the usually received explanation—that the nervous connection was established by a direct radiation along the tubes from the pulp to the sensitive area of dentine—could not hold good, as the intervening dentine might be, and often is, eroded by decay, and yet an outlying mass of dentine remains painful to the touch. In such instances, if the pulp is the source of sensation, it must be established by a circuitous route and by collateral connections. The president then read extracts from a letter he had received from Mr. Alfred Coleman, in which he stated that he had met with cases of sensitive dentine that could only be explained by the views already propounded.—[*British Journal of Dental Science.*

PAROTITIS AND ITS SIMPLE TREATMENT.

BY C. H. VIEHE, M. D., Freelandsville, Ind.

There are three different varieties of parotitis mentioned in therapeutical works and met with in practice, namely: 1. The Idiopathic; 2. The Symptomatic, and 3. The Metastatic form. Of these, the first is the only one this article has reference to in special, as this form is the one most frequently met with.

This is one of the diseases in the treatment of which homœopathy may celebrate its most brilliant successes.

In treating this disease we will, in the greatest number of cases, and nearly in the whole process of its developement, find Merc. Sol. 2x one of the most successful remedies, which I generally administer at intervals of three hours. Sometimes and especially when the swelling is attended with much fever, heat and shining redness, Belladonna 2x and Aconite 2x or 3x may be interposed. Some other remedies, such as Hepar, Rhus., Sti., may be called for in some instances.

In conclusion, I shall refer to an external application which I have found to be one of the very best, and beneficial in this disease in reducing the swelling and mitigating the pain. This is a poultice of Sambucus Nigra flowers, heated and moistened with good vinegar, applied at night, before retiring, kept *in situ* by a bandage or a handkerchief, and left on all night, and, if necessary, to be reapplied the next night, or even during the day-time. The flowers I always use in the dried state. This is the very best external application I have ever seen, and will reduce the swelling generally in the course of one night.

I could present many cases to illustrate this article, and not as yet a single one failed of cure. I may give some in a future number of this Journal.

N. B.—The flowers referred to are not the S. Nigra, but the common Elder. —[*American Homœopath.*

MISCELLANY.

A DISSERTATION BUREAU.—About eight years since considerable commotion was created at home and abroad by a published statement that a certain legally chartered medical college in Philadelphia was *selling degrees.* The rumor proved true, and the institution was suppressed. It is, however, a fact that at that very time one of the smaller German universities was conferring degrees upon men who had never seen a German university, without even the formality of their visiting that country, much less of submitting to an examination. Bad as this was, the said institution required, as nearly all German institutions now do, an original investigation, the result and details of which were to be presented in the form of a dissertation.

Recently Berlin has been greatly disturbed by the discovery in that city of a large dissertation factory conducted by one Doctor (?) Rosenbaum, who also gave private lessons and coached candidates for examination. The authorities have succeeded in securing the books and correspondence of this curious establishment, and found that it had been widely and extensively patronized. Strange as it

may seem, the dissertations furnished were not merely articles copied from an encyclopedia, but really scientific productions, showing that brains and talent were engaged in this nefarious swindling scheme. The charge for a doctor's dissertation was only $112.50, while small papers were furnished for $37.50. Every profession was represented, for the bureau supplied dissertations in jurisprudence, medicine, philosophy, history, philology and theology. Owing to the judicial investigation now in progress many details are withheld for the present. It is thought that an investigation will result in degrading a number of persons who have gained their promotion by virtue of these false papers.

The discovery of so deep and dangerous a plan of systematic educational swindling among the honest Germans should lead them to be more lenient towards us for our sharp Yankee tricks and incite us to suppress our own factories of bogus or worthless degrees, that we may be more blameless than vaunted Germany. Our medical colleges especially should be closely watched in the matter of giving degrees. The title, too, of professor, should be more sparingly applied to second rate teachers, and made to mean something. —[*Scientific American.*

FUSIBILITY OF METALS.—By means of extremely delicate process, M. Violle has lately determined the fusing points of the more refractory metals. The following are given as the exact temperatures for five of these metals in the order of their fusibility: Silver, 1.749° Fahr.; gold, 1.863°; copper, 1.890°; platinum, 3.195°; iridium, 3,510°. It will be seen that pure copper requires a higher temperature to fuse it than gold; ordinary commercial copper, however, melts below 1.035°. Iridium is the most difficult of all metals. —[*Scientific American.*

DERMOID CYST IN THE FLOOR OF THE MOUTH.—Guetterbock reports a case of dermoid cyst, the size of a hen's egg, in the floor of the mouth of a man twenty-six years of age. It was successfully removed.

BATTERY FLUID WHICH WILL KEEP THE METALS BRIGHT.—First amalgamate the zincs, then to one quart of the ordinary battery fluid, (water o ij, sulphuric acid fl ℥iij, and pulverized bichromate of potash ℥iij), add one drachm, (℥i) of the bisulphate of mercury.

DENTITION.—Prof. Thompson, of New York, teaches that the reflex irritation produced by teething is capable of suspending almost entirely the secretion of the gastic juice, and accounts for the sour emesis and stools of undigested caseine, having the odor of fermentation—[*Pro. Med. So. Kings Co.*

TRICHINÆ IN THE FLESH OF GEESE.—Sixty soldiers of the garrison of Thionville, lately fell sick of trichinosis, and two of them died. It has been ascertained that the disease arose, not from pork but from the flesh of geese that they had eaten.—[*Med. Press. and Circular.*

AMERICAN MICROSCOPES.—Dr. J. G. Hunt, of Philadelphia, one of the most experienced microscopists in the conntry, said that it is pure affectation or stupidity on the part of Americans to send to Europe for microscopes when they can get better ones at home, and for less money.—[*Med. and Surg. Reporter.*

OBITUARY NOTICES.

The Faculty of the Baltimore College of Dental Surgery invited the Dental Practitioners of Baltimore City to meet in the College Building on Tuesday evening, January 6th, 1880, for the purpose of taking action relative to the death of Dr. White.

The meeting, which was largely attended, was called to order by Prof. F. J. S. Gorgas, when on motion, Dr. Henry H. Keech was elected President, and Dr. J. Emory Scott, Secretary.

Prof. Gorgas read a sketch of the life of the late Dr. S. S. White, and also a letter on the same subject from Dr. Wm. H. Atkinson, of New York. Eulogistic remarks were made by the President, Dr. Keech, Dr. A. W. Sweeney and others, and on motion a Com-

mittee was appointed to draft resolutions of respect to the memory of the deceased. The Committee, which consisted of Drs. F. J. S. Gorgas, T. S. Waters, and A. P. Gore, reported the following, which were unanimously adopted:

WHEREAS, The Dental Practitioners of Baltimore City having been called together to pay a tribute of respect to the memory of the late Dr. Samuel Stockton White, of Philadelphia, whose death may be regarded as both a professional and public loss; therefore be it

Resolved, That the Dental Practitioners of Baltimore City have learned with deep regret of the death of one who has been for many years closely identified with the Dental Profession, at that period of life when the mental powers are in their fullest vigor, when his honorable career as an enterprising business man had won for him a world-wide reputation, and whose personal qualities, as exemplified in every relation of life, had secured the warm attachment and high respect of a large circle of devoted friends.

Resolved, That the Dental Practitioners of Baltimore City fully recognize the obligations the American Dentistry owes to the late Dr. S. S. White through the active agencies he has awakened for the elevation of the science, his devotion to its interests, and the zeal, energy and intelligence he displayed in useful inventions and dental literature.

Resolved, That this expression of appreciation of the worth of the late Dr. Samuel Stockton White, in the form of a copy of these resolutions, be transmitted to the bereaved family of the deceased, and that they also be published in the different Dental Journals.

Respectfully submitted,

F. J. S. GORGAS,
T. S. WATERS,
A. P. GORE,
Committee.

Profs. Gorgas and Winder on the part of the Faculty of the Baltimore College of Dental Surgery, and Dr. H. H. Keech, on the part of the Dental Practitioners of Baltimore City, were appointed to attend the funeral in Philadelphia.

WHEREAS: The painful intelligence has reached us, that DR. SAMUEL S. WHITE has with appalling suddenness, taken his leave of earth and earthly things, be it therefore—

Resolved: That in his death the nation has lost one of its most energetic, useful and upright citizens; and that the Dental Profession has been bereft of its noblest benefactor and best friend—one who in the prosecution of his extended enterprises, advanced the Art, and by his liberality fostered the Science of Dentistry.

Resolved: That this society is especially indebted for the many kind favors which he has bestowed upon it, from its first organization up to the present time; and that its members deplore his loss, both as a personal friend and as a gentleman who has been ever true and generous to the profession of his early adoption; and that we will cherish his many noble qualities in ever-grateful remembrance.

Resolved: That we extend to his bereaved family our most sincere and heartfelt sympathy for the great affliction which they have sustained.

The American Academy of Dental Science at the monthly meeting held in Boston, December 3, 1879, adopted the following resolutions:

It having pleased an all-wise Providence to call from the scene of his earthly labors and usefulness, our esteemed fellow member John Clough, M. D., of Woburn, Mass., therefore—

Resolved, That the American Academy of Dental Science has heard with deep regret of the decease of our worthy friend and associate, Dr. John Clough, who, as one of the old practitioners of dentistry in Boston, for more than thirty years faithfully upheld the honor of the profession.

Resolved, That in the death of Dr. Clough, the Academy has sustained the loss of one of its most zealous members, dental science an earnest and intelligent advocate, and the community an excellent and useful citizen.

Resolved, That we accord to his memory this heartfelt tribute of respect, and tender to his surviving family our condolence and sympathy in their heavy bereavement.

Resolved, That a copy of these resolutions signed by the President, Vice-President and Secretary, be presented to the family of the deceased and a copy be entered upon the records of the academy and published in the dental journals.

CECIL P. WILSON,
Cor. Secretary.

EDITORIAL.

The eleventh volume of the MISSOURI DENTAL JOURNAL, closed with the last number. The editorial notice of the event was incidently omitted in the December number. The fifteenth of each month is the date on which the JOURNAL is due, yet, notwithstanding the persistent efforts that have been made to bring out the numbers on time, the issues have not been as punctual as they should have been. The delay has been a source of great annoyance to the publisher, and our patrons may feel assured that no effort will be spared to prevent its continuance.

The circulation of the JOURNAL has materially increased, especially of late, and the outlook for the new year is very encouraging.

NEW ADVERTISEMENTS.—We call the attention of our readers to a new alloy advertised in this number, by Dr. Grimes, of St. Louis. We have tested his No. 2 alloy, out of the mouth, in accordance with his directions. After 48 hours no leakage was discoverable, and the face of the filling was only very slightly darkened, the color having a yellowish cast. After removing the filling from the block of ivory in which it was inserted, the amalgam was hammered quite thin with but slight splitting of the edges. It is a maleable amalgam, which we believe is a new feature with this class of filling materials.

On another page will be found the advertisement of a new water motor and a new magnetic dental plugger, both manufactured by the Expert Manufacturing Co., of Newark, N. J.

It is claimed that Dr. Shiland's Magnetic Dental Plugger contains features that are new and valuable. The force employed in giving the blow is derived from a permanent magnet and is given at option, or not at all, as the operator chooses. The blow is said to be similar to that of a hand mallet, and that the plugger may be used with a hand mallet if desired.

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LIFE AND ITS ULTIMATUM, OR WHY OUR FOOD SHOULD BE ORGANIC.

BY J. F. SANBORN, M. D., D. D. S., Tabor, Iowa.

The Living Principle is of too subtle a character for us to define; or to say by what law of the universe it was first called into existence, or to describe by what law of matter, or force, it was first originated.

It is also equally beyond our design, to attempt to explain how matter was first formed from the highly attenuated nebulous material to which the origin of the earth has been ascribed, in common with the other planetary bodies, that compose the solar system.

We are content to ascribe their origin to the "Great First Cause," try to study the laws that govern their action, and their relationship to each other, and advance some speculations as to how this relationship is supported and maintained. Man would achieve but little in science if he did not dare to attempt to work out problems that some of the wisest of men have hitherto regarded as unsolvable.

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Speculation then has its use. Cold reason may sift out the fallacies, and scientific experiment, if she can, may follow in the difficult path that we expect to tread as we follow our subject in its obscure road.

Any thing of which our senses can take cognizance, is matter; from the most unchanging of the earth's structure, to the most etherial of the gases that may enter into its composition. Anything that occupies space is matter.

Matter may be divided into organic and inorganic; the latter may exist from age to age without change of its molecular relations except such as are occasioned by chemical action; the former is subject to vital action, and the changes that take place in the organization of all organic matter.

Prof. Dana says: "In the foundation structure of the globe, firmness and durability are necessary prime qualities, while in the living structure, instability and unceasing change, are the marked characteristics."

The stability of any substance depends on the simplicity of the compound, and the satiation of the atoms that go to make up its molecules. Quartz, for instance, is composed of Si. O. 2, wherein the elements become mutually satisfied, and neither seeks further alliance.

This is among the most simple in composition of all the mineral substances of the earth, and is one of the most stable of all the various compounds that enter into its structure.

By the addition of an alkali, the compound becomes more complicated. and vastly more susceptible to change. Silex is infusible by any heat less than that produced by the compound blow-pipe; but with the addition of lime, soda or potash, or any combination of them, it readily fuses and forms glass.

A rock composed of silex and an alkali is known as granite, a hard resisting rock, but readily destroyed by heat; as was shown by the destruction of large buildings of this material, by the great fires of both Chicago and Boston.

Vegetable structure is very differently composed from minerals. The combinations are less in balance, and they are less enduring; while the most marked characterestic of animal life, is its unceasing change.

The finest mechanical subdivision of matter, is the molecule; and the ultimate chemical decomposition of the molecule is the atom.

The character, number and relationship of the atoms determine the character of the molecules.

Force is that which occasions or arrests motion.

Matter and force are mutually dependent.

Force is not matter, but our only knowledge of it, is in its influence on and relationship to matter.

Wood is matter, and its growth is at the expense of force. When it is consumed it is reduced to its original elements, and force or heat becomes apparent.

Scientists are agreed that neither matter nor force are ever annihilated.

They may both be changed in form, or manifestation, but are never lost.

Light, as force, may be changed to heat, by the arrest of its motion.

Electricity is one of the best illustrations of force. It is a mode of motion, and if arrested in its course, is changed to heat, as is shown by the electric discharge from the clouds in its passage to the earth. If a tree is in its course, it may follow that to the ground, but with a retarded velocity, which is changed to heat sufficient to decompose the sap of the tree and change it into gas, or steam, and an explosion is the result, that rends the tree more or less; or if it be a lightning rod of insufficient size to convey the charge to the earth, the rod will be fused. Wrought iron fuses at 3,240° Fahr. To effect this fusion the rod is raised over 3,200° in less than a second of time, which is a manifestation of force of which we can form no conception.

Force may be manifested as Light, Heat, Electricity, Magnetism, Gravity or Attraction.

Life is a modified manifestation of force, and is the primary cause that evolves the independent bioplastic activity of any organism.

Vitality is a latent state of life force, wherein the life force as motion, becomes dormant, or inactive, as in the germ of a seed As life, there is motion, not a cessation of that motion but a

transfer of it by the plant to the seed as it ripens; in the seed, it becomes vitality, or latent life force.

The vitality of the seed may remain dormant for an indefinite length of time, but whenever favorable circumstances are presented to the seed, it resumes its active condition as motion, thus changing vitality to life; and when once motion is resumed, it must continue until the seed is matured, thus changing its life activity to the latent state, as vitality. Any cessation of life motion, before the seed becomes matured, is death to the plant.

Life then is a modification of force, a mode of motion appertaining to organic matter, and bearing the relationship to it that force does to the inorganic.

Life then is the inherent, independent power that orginates and carries on motion, as life force; while inorganic matter, is dependent on external causes for the force to originate and continue its motion.

They are both forces, but with this difference: in the organic life force, the power to move is within itself; while that of the inorganic, is without or external; the one is independent, the other dependent.

In neither is that force perpetual.

Where there is animal life, there must be a continual supply of latent force in the form of food, in which that force is stored up; then when this food becomes assimilated, the latent force therein becomes apparent force, or life motion in the animal.

The vegetable kingdom, is the connecting link between the forces of nature, and those of animal life.

> "From nature's chain whatever link you strike,
> Tenth or ten thousandth, breaks the chain alike."

The sun is the primary source of force to the earth. Light passes from the sun at a velocity of 186,000 miles per second, which is the highest manifestation of motion of which we have any knowledge.

As light passes through space as motion, it does not impart heat to planetary space; as the temperature of space is supposed to be as low as=80° below °. Fahr.

As soon as the light strikes the earth, it is arrested thereby, or reflected therefrom, according to the angle that the light strikes the

earth. If direct, it is arrested and becomes heat, but if at an angle to be reflected, it passes off into space again.

Ericson, the inventor of the monitors, and one of the most learned engineers of our time, has estimated that the force generated as heat, by the arrest of the sun's rays, is equal to a horse power for every ten feet square of surface. This force may manifest itself as light, heat or electricity; each are more or less interchangeable, and plants utilize them all in ultimating to themselves life force.

It is not to be presumed that vegetation uses from day to day all the natural force that is generated; but be this as it may, a season is considered favorable or otherwise, according to the amount of the natural forces developed by sun-light.

Plants are as dependent on the natural forces for their development, as they are on the earth for plant food. It takes a sufficiency of both, for their full growth. A mistake is often made, in allowing too many plants to grow in a given space, or too many weeds with the crop; thus mutually dividing among the many, what should be appropriated by a much less number, and thereby a less valuable crop is raised.

Field crops do not grow well in the shade of trees, because the trees arrest the the sun-light motion, and appropriate the force, to the detriment of the plants that are planted in their shade, and as a consequence, they have not the energy to appropriate plant food in sufficient abundance to become fully developed.

The parts of a vegetable as the seed, stem, leaves and root, are food, in proportion to the amount of life force therein stored up.

For this reason, grain is more nutritious than hay. Fruit, as apples; or roots, as potatoes are only about one-third as nutritious as wheat, beans, or peas.

The same fact. is shown in the amount of heat produced in the consuming of the grain, as compared with that of the straw.

It is a well known fact, that food for plants, consists of inorganic matter from the earth, and decayed animal and vegetable substances; which on becoming elaborated; furnish material in part for plant structure.

The sun furnishes the amount of heat, the necessary amount of energy to elaborate the food, and to supply the vital action, that shall mature the plant, and which in its own proper time will store

up the life force in the seed as vitality, for the use of the future plant, to start the life action the next year.

Force is always at the expense of matter. Matter is always at the expense of force. What ever grows, does so at the expense of force.

Whenever matter is disintegrated, be it by quick combustion, or the slow process of decay, force will be developed. Involution, and evolution, balance each other.

If the seed of grain becomes rancid, so much of the latent life force has been evolved as force, that the seed for the want thereof, will not germinate.

Fermentation is the first process of decay; and just in proportion as this process has taken place, just in that ratio has it lost the force that makes it valuable for food. Why is this so? Why cannot the chemist combine the ingredients of our food, and present them in a highly concentrated state, so that we can live independently by the products of the soil?

What properties should our food contain, to supply the demands of our vitality?

Why should our food be organic?

Our best physiologists agree with Lionel Beale that, THE LIFE, the living *independent moving* part of animal life, IS IN THE BIOPLASM:

"Bioplasm is the matter that in the first state, is alone concerned in the development of those materials, which ultimately take the form of tissue, secretion, or deposit, as the case may be."—[*Beale.*]

Protoplasm is to the vegetable kingdom, what bioplasm is to the animal kingdom. Bioplasm and protoplasm, cannot be distinguished, from each other under the highest powers of the microscope They are "transparent, colorless, viscid or glue like, and structureless."

The bioplast has the power of self-motion in all directions, assuming forms never twice alike, may exist in mass of $\frac{1}{1000000}$ of an inch to that of $\frac{1}{200}$; as nuclei of full formed cells, it is usually found in masses of $\frac{1}{8000}$ to $\frac{1}{3000}$ of an inch in diameter.

It absorbes nutrient matter, changing it into bioplasm.

Aside from the motions where it assumes various shapes, it has a motion in receiving plasma at the circumference, and passing it to

the center, where it becomes living bioplasm; and a second motion wherein the bioplastic material, passes from the center towards the circumference, where it becomes formed matter, or dead matter.

The bioplasts are the agents that construct nerves, veins, arteries, bones, muscles, and all the structures of the body, by throwing off from their circumference formed matter.

The nerve bioplast never throws off the formed matter of the muscle, nor the muscle bioplast that of bone. Each throws off and forms tissue of its own order.

These bioplasts are so thickly scattered through the tissues, that there is scarcely a space of $\frac{1}{300}$ of an inch in extent without them.

The bioplasts constitute about one-fifth of the bulk of living bodies, and formed matter the other four-fifths. Bioplasm is the sole agency by which every kind of living thing is made. Bioplasts form nuclei, which appear to differ sexually, for it is only after the intermingling of these, in certain cases, that multiplication takes place.

"The coagulation of the bioplasm causes the rigidity of the body after death." *Vide Cooke's Biology.*

Every particle of matter, properly belonging to a living being, is of one of three kinds, viz, plasma or nutrient matter, bioplasm or living matter, and formed or dead matter.

Plasma passes through the walls of the cell, or formed matter, enters the bioplasm and becomes a part of it, as living matter.

In all animal life this plasma must be what?

Is it dead matter, as decayed grain, rotted fruit, or inorganic matter?

If so, then the bioplasm has the power to impart life to the plasma, instead of receiving energy from it, which would require an expenditure of force to raise the dead to the living condition.

That the organization of matter is at the expense of force, is almost, if not quite, axiomatic.

It requires force to raise matter from the inorganic to the organic condition; this vegetation does by the force derived from the sun. This the animal kingdom cannot do, because it is dependent on its food for its force to maintain its own vital action.

It is the special mission of the vegetable kingdom to raise matter from the inorganic, decayed or dead condition, to the organic and

living state, for the use and subsistence of the animal kingdom. For this reason, vegetation has most intimate connection with the earth and is dependent on the sun, the grand source of plant food and force, to enable it to perform as a daily task, this important and indispensable work. Vegetable substances are food in the ratio of the amount of force stored up during their production.

It requires nearly the whole force of the plant to mature the seed, and it withers and dies as soon as the task is performed. Now if the life motion of the plant becomes stored up as latent force in the seed, then it must possess nearly all the food properties of the plant, and the straw has but little or none left in it.

If the force stored up in our food is the essential, to make it of value for the support of our vitality, and if this force is dependent on organization, it must be obvious that any substance suitable for food, ceases to be so as soon as it has lost this force by disorganization.

Inorganic matter is incapable of disorganization, from the very fact that it has no organization in a physiological sense.

Organzied matter and force may be illustrated by the balances, with force in one scale and matter in the other; the higher the organization the greater the amount of force present to balance it. The converse is also physiologically true. The vitality stored up in the seed of the grain may be divided by grinding or cooking, so that it will not grow, but the vital force as vitality, is destroyed only by decay. Grinding and cooking are not decaying processes, so that the vitality therein stored up, has not been impaired unless fermentation has been allowed to initiate decay, or decomposition has been effected in some other manner.

The vitality stored up in organic matter and used as food, is *transferred* to the bioplasm; the latent force as vitality, becomes apparent motion as life force, thereby adding to the life energy of the bioplasm, imparting strength to its activity. Thus is vital energy sustained in full vigor by the continued addition of plasma to the bioplasm, and therewith life energy from the vitality of the food eaten, wherein the force stored as vitality becomes energy in the bioplasm.

The matter in the seed used for food, becomes matter in the bioplasm; in like manner the latent force in the seed becomes life force

in the bioplasm; and thus by the continual transfer of this force, the life energy is maintained.

Now if the food is not organic, or if the organism becomes destroyed by chemical action or decay, the stored up latent force has been evolved, and the plasma without it, cannot add energy to the mass, because it is not there to add.

As vital force is dependent on the continuity of the molecular organism, and as chemical action on either organic or inorganic matter, consists in a re-arrangement of the atoms of the molecules of the subject matter; it will be obvious that the organism will become destroyed, and the vital force will be such no longer, whenever chemical action takes place.

It is not claimed that all organic matter is food, but that all food to nourish animal life, is and must be organic.

When the plasma has been received and passed from the circumference to the center of the bioplast, it becomes a part of the bioplasm. While this is taking place at the center, the formed matter is being thrown off at the circumference, and as such, has no further power of self action or independent motion; and is ready for disintegration and depuration.

A chemical decomposition of our food shows that it is composed of C. H. O. N. united in various proportions, and not in such a balance as to be permanent in character. Starch, $C.^{12}$, $H.^{20}$, $O.^{10}$; sugar, $C.^{12}$, $H.^{24}$, $O.^{12}$; glucose, $C.^{12}$, $H.^{14}$, $O.^{14}$; fat, $C.^{12}$, $H.^{16}$, $O.^{12}$. These are carbo-hydrates or non-nitrogenous substances, and are appropriated as food by the bioplasts that throw off fat as formed matter.

Gluten, caseine, fibrine and albumen are $C.^{48}$, $H.^{36}$, $O.^{12}$, $N.^{6}$, and are known as nitrogenous or albuminous substances, and furnish plasma for the bioplasts that form muscle.

The inorganic elements, as they are called, carbonates, phosphates and fluates of lime, as found in the osseous structure, are as truly organic in the grain, as are the gluten, sugar, or starch, and must be as truly organic to become plasma for the sustenance of the bioplasm of the osseous structure, as is the food for any other part of the system.

A chemist might as well think of compounding artificial albumen to nourish the muscles, as to think of making phosphates for the

brain, or that will nourish the bones; and neither are of any more value, than counterfeit money at the United States treasury, wherewith to procure gold.

The formed matter of the system has its use, as well as the bioplasm, and as four-fifths of the body is of this structure, its physiological use is better known than that of the bioplasm.

But our subject has a use for it that has hitherto been too little known, and studied.

In respiration, oxygen is received into the lungs, and carried by the red blood corpuscles to where it is wanted, and is there used to oxydize the formed matter.

And as force is always at the expense of matter, in this disintegration of formed matter by the oxygen, we shall expect to find force evolved.

In the build-up, we find a physiological action where vitality is transferred to the bioplasts, and becomes life force; in the take-down of the formed matter we shall find the action is a chemical oxidation, and force is evolved.

In the consuming of wood, we have oxygen combining with carbon, forming C. $O.^2$ and water. In this disintegration we have heat evolved. In the oxidation of the tissues there is heat evolved as in the case of the wood, and we find it utilized as animal heat; and as this break-down of tissue takes place in all parts of the body at the same time, so we may expect to find animal heat every where present. In combustion there is more or less electricity evolved. In the oxidation of formed matter there is also a force evolved that bears some relationship to electricity, which ultimates in what we call nerve force. This force is conveyed by the afferent nerves to the brain, which organizes it into brain force.

As the lungs purify and vivify the blood, as the stomach digests the food, so it is the function of the brain to vivify the nerve force, and it becomes brain force.

In the galvanic battery the oxidation of metal develops electricity, which is known as the direct current, and corresponds to the current of nerve force as it passes through the afferent nerves to the brain.

In the battery this current, though abundant, is scarcely perceptible to one who may take it; but as it passes through the magnet

and helix, it becomes wonderfully changed, and is more than ten times as difficult to bear.

The longer and finer the wire that surrounds the helix, the higher the current becomes magnetized and refined, and the more like the life current, and the more a person can take with ease and pleasure.

The brain, like the coil of the helix, the finer its structure and the deeper the convolutions, the finer will be the thoughts, feelings and sensibilities, and the greater its producing force.

If we compare the living system of man to the galvanic battery, we shall find the break-down of tissue to correspond to the oxidation of the zinc. This takes place in the formed matter in all parts of the body, from center to the circumference, and the primary current is formed. The afferent nerves correspond to the connecting wires that convey the electricity to the magnet and helix.

The magnet and helix magnetize, modify and diminish the size and increase the velocity of the current, and when received at the electrodes it is scarcely to be recognized as being the same kind of force as the primary current.

The brain is the helix of the living battery, that vivifies the nerve force or primary current. It diminishes the size, while it increases the velocity and intensity, and it becomes brain force for originating thoughts, feelings and sensibilities.

The life in the bioplasm is not the sole end of all this complex, vital machinery, although it is of prime importance as a factor in the equation. It is the disintegration of formed material, resulting from its oxidation, which gives rise to the primary current that passes to the brain, the living helix, which elaborates the force that gives the power to produce thoughts and ideas that may change the destiny of nations, or that shall live when ages have passed away.

CONCLUSIONS.

The vegetable kingdom is the medium by which matter is developed to the first step above the inorganic, and force as manifested in nature, is raised, refined and utilized into vegetable life.

The animal kingdom is of a higher grade of manifestation of life, and is not only higher but further removed from the inorganic.

It requires this higher organization, to take the force as left by

vegetation, and raise it to a higher and more refined gradation, that ultimates in brain force; and by the addition of its strength to the impetus, sends it onward and upward in its developement.

Can you invent a machine that can think? You may as well expect to, as to presume that animal life can be derived directly from inorganic matter, and therefrom to originate living thoughts, and thus overleap the intervening steps ordained to be taken by Deity, and usurp the peculiar province of Him, who alone can make alive.

If man cannot keep alive that which is already organized, how can he raise to life that which is to be organized before it can have life.

Our food then must be not only organic, but it must possess latent force as vitality, to be changed to apparent force as life, and thus contribute to our life energy, strength to perform the highest duties of life; to think and act.

The mind is the Sovereign Ruler, the body its willing subject, ready to live to do its behests, or to die to enhance its power.

Matter and force may change their modes of manifestation, but are never annihilated. When a force becomes sufficiently refined to become thought force, is it ever annihilated? when the highest powers of the most refined organization have been required to develope, modify, and refine to so high a degree as to become almost angelic, shall it degenerate as does matter, back to the lowest manifestation of force? Shall it cease to be? Shall it become annihilated? Or shall we say that thought force, like matter, is never, *never* lost; but rather that all great thoughts as originated, are sent forth to become united with the great ocean of thought force, from which those who will may draw, from time to time, as they have occasion, and have the mental strength to control and use.

Few persons can raise the weight lifted by Dr. Winship, neither could he at first, but after years of gymnastic practice, he could lift over 2,700 pounds.

As gymnastics develop the physical, so education developes the mental powers. It enables them to lift, to control, to handle thoughts, or ideas from the realm of thought force, as much beyond what ordinary minds can control, as 2,700 pounds will compare with what Dr. Winship could do when he first began.

Animals have more or less of this power to think, and they form the connecting link, between vegetation, the lowest manifestation of life, and human mentality, which is the highest.

Human beings are of various grades of physical and mental strength, as well as susceptibilities. Our subject teaches that without force there can be no organization; without organization no vegetable life, or vitality; without vegetable organization no animal life; without animal life, no consciousness, no voluntary motion, no power of thought, no motive to act.

Truth and principles emanate from Deity, thoughts and ideas are the province of man; and when they lead to a knowledge of the divine emanations, they are the highest ultimate of human life.

May we so live, think, and act, that we may ever contribute to the ever onward and upward, in the development of the great and the good of the race, that man may attain to his proper sphere of action, wherein he shall rule in the sphere of thought, as Deity does in the universe.

DENTAL REFORM.

BY OUR ENGLISH CORRESPONDENT.

(Continued from page 15.)

The Act next proceeds to declare that no one shall be able to recover a fee for any dental operation unless he is registered under the Act "*or is a legally qualified medical practitioner.*" Such a man may style himself a dentist and recover his fees without registration. It next declares that—

Any person who—

(*a.*) Is a Licentiate in dental surgery or dentistry, of the medical authorities; or,

(*b.*) Is entitled as hereinafter mentioned to be registered as a foreign or colonial dentist; or,

(*c.*) Is, at the passing of the Act, *bona fide* engaged in the practice of dentistry or dental surgery, either separately or in conjunction with the practice of medicine, surgery, or pharmacy, shall be entitled to be registered under this Act.

With regard to *b*, it is declared that—

"The certificate which is to be deemed such a recognized certificate as is required for the purposes of this Act, shall be such certificate, diploma, membership, degree, license, letters, testimonial, or other title, status or document, as may be recognized for the time being by the General Council, as entitling the holder thereof to practice dentistry, or dental surgery, in such possession or country, and as furnishing sufficient guarantee of the possession of the requisite knowledge and skill for the efficient practice of dentistry or dental surgery."

It canot fail to be observed that in this, as in every part of the Act, Parliament has been liberal enough. It is the working of it that calls for comment.

In conformity with this clause, there are registered as foreign dentists, out of all there are in the country, two (2) gentlemen holding the D. M. D. degree of Harvard. The holders of the D. D. S. degree of the University of Michigan are also entitled to register because it is affirmed to give medical education superior to the other American schools and *requires more time.* The holders of all American degrees with these two exceptions, from whatever college attained, are rigidly excluded as not "furnishing sufficient guarantee of the possession of the requisite *knowledge* and *skill* for the efficient practice of dentistry." That the men who got up registration are able to so manipulate it as to make themselves appear in the register as qualified, while their modest, and as a rule more competent, countrymen appear as unqualified men, are only tolerated because they have acquired vested rights by being in practice; and that the diplomas of these men whose example and teaching have done so much to elevate dentistry, out of the miserable condition into which these reformers have brought it, and against whom the qualified (?) men have to be protected, are not recognized because they do not "furnish sufficient guarantees of the possession of the requisite *knowledge* and *skill* for the efficient practice of dentistry," —is quite too farcical for serious consideration. Without doubt so neat a performance has given the reformers immense satisfaction; which must have been increased on finding, from a meeting of some American graduates in London, that they did not like it. It is to be hoped that these riled Americans will not push their grievance too far, for so much bliss as their discomfiture must engender,

might prove serious to some of the reformers. If the holders of D. D. S. degrees leave the matter to the sensible portion of the public they will, when the truth gets known, laugh the little gentlemen, who would be great without the elements of greatness, back into a more serious and sober state of mind. In the meantime the American degrees will, as before, be evidence of real qualification. And if the holders of these degrees could be induced to take the same jealous and narrow view of the matter as the reformers, they would rejoice that, having got settled here, these gentlemen had unwittingly protected them against the inroads of any more of their only rivals.

The rest of the Act is taken up with arrangements for the examinations, all of which are to be under the control of some one of the authorities which have the power to grant medical degrees; the disposition of the fees received for registration; the removal of names from the register; the exemption from serving on juries; and so forth.

The number of dentists registered in the United Kingdom are—

		NO.	Per cent.
(*A.*)	Licentiates in Dental Surgery of the following Colleges:		
(*a.*)	Royal College of Surgeons of England.....	336	6.35
(*b.*)	Royal College of Surgeons of Edinburgh...	11	0.21
(*r.*)	Faculty of Physicians and Surgeons of Glasgow	5	0.09
(*s.*)	Royal College of Surgeons in Ireland.....	131	2.48
	Licentiates in Dentistry.....	483	9.13
(*B.*)	Persons, on their own Declaration, in *bona fide* practice of dentistry:		
(*a.*)	Separately.....	2,707	15.18
(*b.*)	In conjunction with the practice of Medicine,	17	0.32
(*r.*)	In conjunction with the practice of Surgery,	11	0.21
(*s.*)	In conjunction with the practice of Pharmacy,	2,049	38.74
(*e.*)	In conjunction with the practice of Medicine and Surgery.....	20	0.38
(*f.*)	In conjunction with the practice of Surgery and Pharmacy.....	2	0.04
	Bona fide Dental Practitioners.....	4,806	90.89
	United Kingdom Dentists.....	5,289	100.00

Thus we have 5,289 persons registered under the Act, of whom 2,707—just over one-half—are entitled to register as being in practice as *bona-fide* dentists separate from all other occupations. Under this head are the holders of the D. D. S. degrees. And 2,049, or nearly one-half, are persons who are pharmaceutists, or mis-called chemists, or known in America, as keepers of retail drug-shops. These shop-keepers take apprentices who are to be taught pharmacy and dentistry combined. Their practice is like nearly all that goes under the name of dentistry here, and consists almost entirely in extracting teeth, and making false ones. A few forceps and scalers and the appliances for doing vulcanite work is all they require. There are 483 "Licentiates in Dental Surgery." As these men hold the only qualification recognized, the natural inference would be that they represented the *elite* of the profession. A greater mistake could hardly be conceived. Only a very small portion have passed through any dental school; and nearly all of the holders of the dental license, even of the College of Surgeons of England, obtained it by an easy examination *sine* curriculum. But when registration began to loom up, and the L. D. S. license began to have value, the standard was raised, which cut out a good many who had been clamorous for reform and hoped to profit by it. Not to be outdone, an arrangement was made with the Royal College of Surgeons of Ireland,—the nature of which I leave the holders of the English license, who hoped to have a monopoly of the legal qualifications, to describe, which they do in language neither choice or weak—whereby 131 persons were granted, by that body, a license to call themselves qualified dentists. It was a bit of sharp practice whereby diamond cut diamond, and the reformers have no right to complain if they were out-done in this sort of thing. But, while some of the holders of the Irish license are very much better entitled to a qualification than almost any one of the English Licentiates, the manner in which the Irish College lent itself to this scheme, and the position and character of a large majority of the men it passed, has made the non-possession of its license a distinction to be coveted.

The time for registration expired January 1, 1879, and we had a right to hope that this would have ended the pursuit of dental politics. The energies of the profession have already been absorbed

quite too long in purely legal affairs, and it was time it began to turn to scientific matters. The call for a general meeting of the profession in London, early in this year, for the purpose of forming the British Dental Association, seemed to carry with it the idea that, registration being accomplished, our ambition should now turn to something higher. The high sounding name of the new society implied to any one not of the make-believe class, that it could mean nothing else, and was to inaugurate a new and better era in dentistry. The meeting was largely attended by men from all parts, the President read a long speech, the secretary made a report, speakers followed in glorification of each other, and finally a series of resolutions were passed which simply meant that the Reform Committee was to be continued under a new name; and that, having got registration, this society was to keep off the register all the names possible. The result of this meeting was, and yet it was not, a surprise. The leopard cannot change his skin, and the getters-up of legal qualifications and the despisers of finger craft, cannot be made to see that the way to elevate dentistry is to elevate the individual dentist, and the way to get an educated profession is to educate its members—in short, that the way to do a thing is to do it, and not something else. It was not a surprise therefore to find the formation of the British Dental Association did not contemplate the advancement of Dental Science—at any rate for the present. That there could be no mistake in the matter a 'gentleman present asked if the meeting was merely to form a dentists' trades-union; to which the President and Secretary replied that if he had noticed something or other in the President's address he would have his answer. This was an evasion, and the whole proceedings gave distinct indication that the society is to have no scientific character. Fancy the British Medical Association, or the American Dental Association, having no object but Medical or Dental politics, and hunting up by means of a spy system, offenders against the penal clauses of medical and dental acts of the legislature! Yet it was a surprise to find how far certain men can go without seeing the inevitable consequences of their doings. So long as men act justly and independently they interfere with no other man's rights; and the end of progress is to lift up human nature to that point where each man may have all his right without infringing

upon the interests of others. But when a body of monopolists begin to acquire legal privileges, they must intefere with the natural and acquired rights of others. The moment the dentists act was projected, the licensed medical men and pharmaceutists were in arms. We have seen that the medical men were strong enough to entirely exempt themselves from its provisions, and are not even required to go to the expense to which the dentist is put in the registration fee, although they practice dentistry and nothing else.

The pharmaceutists were not able to go quite so far; yet they were powerful enough to protect their "vested rights"—and hence we have 2,049 men on the register never before ranked as dentists; and the Act is so worded that few of these names can be removed. With that obliviousness to the consequences of their doings, characteristic of the reformers, such an influx of "chemist-dentists"—as they are now called—was not anticipated. And as many of them as possible, must be got off the register. This is the work to be performed by an organization that styles itself the British Dental Association! Parliament appeared to know the kind of people it was dealing with and put no power in their hands. It all rests with the Medical Council, to whom notifications of illegal registration are to be sent, which restricts the business of the British Dental Association to the attaining of such information as will induce the council to expunge certain names from the register. Even the editor of the "British Journal of Dental Science" could not tolerate such an organization, and has asked that his name might be removed from the list of members; for it is one, says he "which, in my humble opinion is opposed in every sense to the principles upon which *alone* Sir John Lubbock"—the member o Parliament who took charge of the dentist's Act—"himself has declared the bill could have become law—that is, the recognition of all existing rights." Mr. Fox thinks he will be attacked and misrepresented. He need not fear. It is a step towards winning back the confidence of the men who care more for improvement than penal restrictions.

Thus the matter stands at the present time. What the future of dentistry is to be in England remains to be seen. That so robust a profession can be permanently crippled by the follies of those who have attempted to control it is not possible. It will grow and thrive

in spite of them. But there can be no doubt that a pernicious step has been taken. We are now strong enough to make our strength felt in a legitimate manner if our energies were properly directed, and should stand before the world and command the respect that is our due. It is thus most humiliating to find that we are thrust into an inferior position, because a set of little men are unable to comprehend the situation.

There can be no doubt that a large majority of the dentists welcome reform in so far as it offered a prospect of a less number of dentists in the future. Beyond this there is little sympathy with reform and the reformers. Indeed, my remarks are feeble to what I hear commonly expressed on that point. That it will have the effect of lessening the number of registered dentists for a considerable time is undoubtedly true. But is that a good? To the public, undoubtedly not. It is always best served by healthy competition, and this is not only eliminated, but, so far as reform has influence, is destroyed. Nor will it prove a good to the better men in the profession. The principle is, and the effect will be the same as all trades-unions, the ignorant, idle, and incompetent—and especially the self-assertive—will be protected at the expense of the intelligent and progessive. The latter *never need protection.* They can hold their own anywhere, and an influx of inferior men helps rather than injures them. This was curiously admitted by the advocates of reform. "It is all very well for *you*," was their argument, "*your* position is such that you do not feel the influx of these common fellows, but look at us." Of course the answer rose instantly to the lips. "This only shows that to excel is all the protection needed," but it had no influence, for an obvious reason

Will a less number of dentists prove a permanent benefit to those who are licensed to practice? This is assumed as an undoubted fact. But is it so certain? The number of dentists are now five times what they were twenty years since, and at the same time there are more good practitioners. The reason is obvious; more attention is paid to the teeth, and this disposition increases under the influence of healthy progress in dentistry. Will it increase under registration and its influence? We shall see. My own impression is that registration will in a pecuniary sense, for a time, benefit all the men whose practice consists in making false teeth,—which is by

far the greatest part of the ordinary dentists work,—for the influx of small men will be entirely stopped. But in the long run it will have an effect not contemplated by the reformers. They never can get an Act of Paliament to prevent any man making, and getting his pay for, artificial teeth. The most they can hope for is already in the Act, which declares that none but a registered person shall be able to collect a fee for any dental "operation." How this word operation is to be interpreted remains to be seen. If literally, it includes all sorts of dental *work*. But as dentistry is, by the Act, considered only as a part of surgery, it may be confined to a surgical operation, and not made to apply to artificial work. In any case the maker of false teeth has only to follow the custom which is almost universal now among the inferior men, of requiring a substantial deposit when the impression is taken, and the whole of the money when the work is done. The result will be that people who "make and insert false teeth" will arise, and nothing can stop them. They will not call themselves dentists and that is all. With a certain class they will be prefered to the registered man, under an impression that they are not monopolists and work cheaper. Hundreds of the chemist-dentists are such only in so far as they extract teeth. They got on to the register under an impression that it was necessary to protect this "vested right." It was quite a mistake, for they never extracted teeth as dentists. The maker of false teeth may extract all the natural teeth he likes and be paid for it, and nothing can prevent him, unless he persists in calling himself a dentist. Besides, among the inferior dentists, it is almost universal to make no charge except for the purely mechanical work. The reformers have talked so loud and large, that men who have never read the Dentist's Act, have been frightened; but when its real character gets known, I have a strong conviction that it will signally fail in just what it was especially intended to accomplish; and that just as it has got two thousand men on the register as dentists who were not known as such before, it will be the means of creating a new order of men, who will be pernicious and powerful rivals as "makers of false teeth" for the million. This leads up to another matter the reformers have, with their usual inability to see the consequences of their doings, entirely overlooked. The source from which, to a very great extent, the

dentists have been recruited has been the mechanical workman. Your "Harrys," "Bills" and "Toms," have been in the habit of putting on their doors, in the little back street where they live, "Mr. Blank, Dentist." In time they get a little money and launch out into a practice of their own. A large majority, and indeed some of our best dentists, have originated in this manner. The very men who have got into the profession in this way are now, of course, anxious to shut the door against any further influx from the sources from which they sprung.

The intention is avowed to "keep the artificial workman in his place." But will he consider the place assigned his proper one, and will he stay where he is put? Certainly not. Manners are catching, especially bad manners, and the artificial workman who was respectful and contented because he saw a prospect of independence, will begin to look after his "vested interests." That means a trades-union; by means of which the employer is, after the manner of such organizations, told what he must pay for his work; how, when and where it shall be done; and whether he can have his work done at all if any part is executed by himself or his students; how many apprentices are to be taken by the workman, and so on. Non-compliance will end in a strike. As all who have large practice are dependent on these men, the prospect is not delightful. Besides, the necessities of a large practice will create the very class of men who will recruit the ranks of the "unqualified" dentists — that is men who are as much dentists as four-fifths of those now in practice, independent of pharmacy, but who do not call themselves dentists but "makers and inserters of artificial teeth." Moreover, they will advertise their excellence by stating that they were "late principal assistant to Mr. Blank," which informs the public that it can get Mr. Blank's work at very much less than Mr. Blank's prices. When the north wind blows on an exposed thermometer the mercury sinks, and no act of Parliament can keep it up to summer heat. There are unalterable laws which determine the true status of dentists and dentistry, as well as the bulk of mercury, which no act of Parliament can influence. A man and a profession is respected just in proportion as he, or it, contributes to the public good. The man gets fame, honor and reward just as he is supposed to fulfill this condition, and a profession takes rank just as it accom-

plishes this end. Any other effort is contrary to the laws in such cases made and provided. So we see that the undoubted end of reform will be total failure in all that was really intended; and, moreover, it will introduce trouble and discord where there was before peace and harmony. There is another matter little considered by purely selfish minds. What we will to do is, to us alone, good or evil according to the motive which prompted it. If the motive intended only good to ourselves and no good to others, it does not follow that the result will be as we desire; on the contrary, moral philosophy distinctly teaches it can never be as we desire. It is ourselves alone that are made better or worse by our motives; and the acts we perform are, just as soon as they pass away from our control,—which they almost instantly do,—at once under the control of those influences which, from beginning to end, from the greatest to the least, are exerted in a manner to place everything in its proper position, so that it will do the minimum of harm and the maximum of good. This accounts for the well known fact that all schemes founded on selfishness crumble to pieces, and only the good lives. It also accounts for another thing. All progress demands activity; and the moment activity, even although it was prompted by an evil motive, passes out from under the control and influence of that motive, and comes under the control of the universal laws which are always working for good, it promotes progress; although it may have originated in an influence that would have smothered it, were there not something higher and better than the meanness which gave it birth. It is not in the nature of things that anything in which the aims are puerile, the agents blind, and the results vague and purposeless, can ever come to any good unless under these considerations. But dental reform has done and will continue to do good, on the principle above indicated. The profession felt that something should be done. Certain men saw a chance to mount a needed movement and ride it as a hobby. If what they have done is not wise, it is the best they knew; and it has stired up activity where before was sloth. Their faults and follies will soon be apparent, and will pass away as the modest good sense of the profession, so far latent, is brought out; and the day is not far distant when English dentistry will rely on its merits and not on extraneous support. Englishmen may, as is sometimes

charged, be obstinate and illogical; and it is true that they hate to move out of settled grooves; but once aroused, their unsurpassed energy, sound judgment that clearly indicates the issue, and their straightforward common sense that leads directly to the point, always puts their house in order with marvellous rapidity. If the reformers had their way the student would have to go through their schools to get his license, and somewhere else to learn how to practice dentistry. But the act of Parliament does not give them their way, although they manipulate it to effect their purpose in some things; nor will any act ever meet their views. On the other hand, new schools will arise where dentistry proper will be taught. In time the cohesion of the better elements of the profession will create a strength that will break the degrading bonds that have made us an humble appendage to a sister profession and given it the power to govern us with nothing left but to suggest and remonstrate. And in time we shall take the position we have so well earned, as one of,—and by no manner of means the least honored,—of the learned professions. There has been, I am aware, a good deal of interest taken in America in the result of this movement; and I think it is clearly shown, in what has been stated, that dental reform does not contemplate the building of dentistry on the same line that has led to such success as in the United States; and that, so far, the American dentist will find in it, nothing to imitate, and everything to avoid.

PROCEEDINGS OF SOCIETIES.

MECHANICAL DENTISTRY.

BY DR. EDGAR D. SWAIN.

(A paper read before the Illinois State Dental Society.)

The subject of Mechanical Dentistry, though occupying a back seat in the profession, is not entirely devoid of interest; and although minor improvements are being continually made and brought before the profession they fail to elicit that interest which attaches to anything new in the so-called operative branch of our profession.

To be able to put six blocks of porcelain teeth upon a base of

rubber or celluloid fully satisfies the average practitioner, and with the present indefinite ideas as to where the line of demarcation between the mechanical and operative branches should be drawn, it really seems strange that we have a division at all. With more experience and more intimate acquaintance with the duties devolving upon the practitioner of dentistry, I am inclined to the opinion that were the mechanics taken out of the science of dentistry, little would be left to the gentlemen who so loftily ignore the title of Mechanical Dentist.

To prepare the cavity of decay in a tooth for the reception of a filling of gold or other material may be operative or surgical, but with the packing of the first piece of filling again commences the mechanical; therefore, there is left to the operative or surgeon dentist the preparation of the cavity to receive the filling, and the treatment of a few diseased conditions of the soft tissues of the oral cavity which accidently fall into our hands, as with the surgeon, whose duty, as such, ends with the dressing of the stump of the amputated limb, when the mechanic is called to provide the substitute.

The slaughter of the innocents, we are daily reminded, continues where the free use of gas prevails; and the yawning pocket of the *surgeon* dentist is always open to receive one dollar per tooth for extracting, and eight dollars, or less even, to supply the substitute which has been made necessary, through the incompetency of himself as a surgeon dentist. Having filled the teeth repeatedly, and with each failure assuring the suffering patient that her teeth "do decay away from the fillings so," the unfortunate, tired with both the expenditure of money and time, backed by the assurances of the "surgeon dentist," as blandly expressed as the innocence of the "Heathen Chinee," that the only thing left is the extraction of the ruined members, and the securing of one of his unequaled substitutes therefor; and from that time no more filling, no more pain, no more expense.

Since I last addressed this society upon this subject, there have appeared several quite important improvements in this branch of our profession; and I think that, with the generally increasing intelligence of our brethren in the profession, there is a growing tendency to save or utilize partially decayed teeth and the roots of

all the teeth, even though the operations be not of the character properly denominated operative, or the building of contour fillings; but by placing upon them artificial crowns of either gold or porcelain. It is evident from the numerous improvements upon old methods, and inventions of new, that our thinking men and inventors are giving more thought to this branch of our work than in former years, and that the results thus far warrant continued exertions.

Of these improvements or inventions I shall speak but briefly, and with the hope of increasing the interest of those present in this direction.

First, I will call attention to the methods of Dr. Richmond, of San Francisco, and Dr. Hall, of St. Louis, for constructing and setting gold crowns upon the roots of the bicuspid and molar teeth—methods which, to my mind, are to mechanical dentistry what the rubber-dam was to operative. Either of these methods contemplates the manufacture of the artificial crown out of the mouth and in the laboratory, except so much fitting as may be necessary to the root they are to be worn upon.

The Richmond method is the most simple and easy of the two, and except in the artistic imitation of the form devised and used by the Creator, answers equally well the purpose.

The first part of the operation must be classed under the head of Dental Surgery or Medicine, as it consists in the curing of any diseased conditions which may exist in the soft tissues enveloping the root, as formed abcess, ulceration, periostitis, etc. This accomplished, a band or tube of coin gold is, with the plate benders. pliers, or other convenient manner, fitted to the root so closely as, when soldered, to require considerable force to send it to its place; this tube to extend below the margin of the gums, in some cases as far as the edge of the process, and as high as the contemplated crown. The metal being soft, it will be found to adapt itself readily to the tooth or root to be fitted. This tube or barrel forms the sides of the crown, and when fitted should be cut a little shorter than the required length contemplated, then upon the end solder a disk of same material. Then melting down some of the clippings from the plate used, into beads, these to be slightly flattened under a hammer, so as not to roll about, are soldered upon

the disk and filed into cusps, two to be used for a bicuspid tooth, and four, more or less for a molar. The æsthetic taste of the operator will of course, settle the question as to the finish. We now have a gold shell shaped more or less like the crown of a tooth. The solder used is very fine, and so alloyed as to retain the color of the coin gold, consequently no unsightly seams are seen in the finished work. Frequently these shells are placed over enough of the crown of the natural tooth to retain them firmly without the aid of screws; but this being entirely gone, screws of nickel or gold may be set in the root. Fill the shell with oxy-chloride of zinc, and force home to its place, and we have an artificial crown, without subjecting our patient to the all day's torture of packing enough gold foil to have built it up, and firmer and more durable than possible to make with the old method. The fine mechanical ingenuity, close workmanship of the operator, with nicety of adaption, all add to the success of the operation.

Dr. Hall's method differs not in the result so much as in the manner of arriving at it. First, cast-iron dies are procured of the grinding surfaces of bicuspids and molars, and that part of the crown is swedged into a disk sufficiently large to form the crown contemplated; then V shaped notches are cut out, allowing the sides to be brought down, forming the sides when completed. This crown is drilled in some convenient place to allow the packing of amalgam, to retain it in place, screws having previously been set, about which the amalgam is to be packed. This when completed makes a very durable as well as artistic piece of work.

Both of these methods provide for the facing of the crown with porcelain, whenever desirable to hide the gold, as often is the case with bicuspids, by simply sawing out enough of the outer portion of the gold crown to allow a plate tooth to be secured there. This I have done in several cases with results highly satisfactory to the wearer.

The Richmond process also provides for the setting of pivot teeth upon roots of the six anterior teeth, so constructed as to prevent the splitting of the root. The process for accomplishing this is so complicated that I will not attempt to make it clear in an essay of this character. I will, however, say that I have not been

entirely successful with this work, and acknowledge the fault to be in a measure owing to imperfect manipulation.

In regard to the use of oxy-chloride of zinc for securing the gold crowns in place, I desire to caution all, that they be very particular to remove every vestige of it from about the neck of the tooth, going with properly shaped instruments under the free margin of the gum, also wash out repeatedly with water, or, what is better, bicarbonate of soda and water. Unless this is thoroughly done the parts will slough away, leaving an unsightly operation, as well as removing the valve formed by the gingival margin to keep the secretions from penetrating to the oxy-chloride inside the shell. I met with this experience in one case, and have since been cautioned by Dr. Richmond himself, who had experienced the same trouble.

Next I desire to call your attention to some improvements made by Dr. Holbrook, of Waukesha, Wis., consisting in changes made in the impressions and plaster models, so as to secure results which every mechanical dentist has long felt the need of. It does away entirely with the usual form of vacuum cavity so long in use, securing a much better adaptation, and largely, if not entirely, avoiding the liability of rubber and celluloid plates to rock, as we express it, and decreasing very largely the liability to break through the mesial line of the plate, also securing to the lower plate a very good adherence from atmospheric pressure or suction. This is accomplished without the use of soft rubber edges, flanges, or any of those devices which have heretofore been tried and found wanting.

The improvements work equally well with all kinds of work, metallic or plastic, and I feel confident that their adoption by those who manufacture the porcelain work would assist very materially in overcoming some of the greatest difficulties they have to contend with. The process through which these results are accomplished I am debarred from giving you, by letters patent.

And, now, one more secret and I am through. All hear more or less complaint from patients wearing rubber plates, of a burning sensation, feverishness, and often congestion of the parts under the plate. A small piece of sulphate of zinc, anywhere in the neighborhood of ten grains, dissolved in a large spoonful of vinegar, and washing the plate thoroughly with the preperation, has frequently resulted in the complete cure of very aggravated cases. This may not

be a specific, but its use has been so satisfactory that I felt it worth giving to the profession; and if others give to their patients the same amount of relief which several of mine have received, your money and time spent in attending this session of our Association will not have been entirely wasted.

DISCUSSION.

Dr. INGERSOLL described an operation for restoring a broken bicuspid. There remained only a small portion of the inner part of the crown, carrying the inner cusp. A screw was set in the root, a cuspid tooth with headed pins (a rubber tooth) was fitted, the pins bent to embrace the screw, and all the spaces packed with amalgam. This is now in perfect condition after a year and a half of service. Two others like it are also giving excellent satisfaction.

Dr. BLACK said he lives away back in the country, and is an old fogy. Sometimes has a patient with a broken off incisor tooth of much importance. In such a case he enlarges the root-canal, filling up to the apex with gold, and fitting a piece of plate tooth to the broken margin, but so as not to touch. Puts on a backing with a long three-cornered exsension set edgewise to the ordinary backing. This will reach into the enlarged root-canal, and is packed around with gold, securing the crown and covering the exposed portion of the root or whatever remains of the natural tooth.

Dr. A. W. FREEMAN described his method of setting a pivot tooth. After dressing the root as may be required, drills a pivot-hole to suit a platina wire, gets a plaster model, fits a cap of very thin platinnum to the end of the root (on the model), with hole for pivot, fastens cap and pivot with solder, fits a plate tooth and solders to cap, and sets in the roots with red gutta-percha. If the root is much decayed, sets a platinnum tube by means of amalgam, and sets the tooth after it is well hardened.

Dr. SWAIN showed a way of having a block of teeth carved (bicuspids for instance) to suit a case; being fitted acurately to the ridge by grinding, and having pins in the proximal faces for the attachment of clasps to embrace the cuspid and molar. Described a case of lower sixth-year molar, which was well formed and sound from the gum about half-way to the grinding surface, but in the upper portion one groove succeeded another, and there was little or no

enamel upon the grinding surface; decay in the grooves and in all the depressions of grinding surface, pulp alive. Much of the top was cut off, removing the decay, and a gold crown was fitted, which was set first with gutta-percha, and failed; but was re-set with oxy-chloride of zinc (cement plombe), and is doing well. When the Richmond crowns are to be set upon roots with contracted necks, what remains of the bell-shaped enlargement above the neck must be cut away before fitting the ring. These operations require nice workmanship. A man may be very learned, and thoroughly scientific, and yet fail of being a useful dentist, unless he has acquired manipulative skill so that he can do fine work.

Dr. BROPHY thinks the grooves described in the case mentioned by Dr. Swain to be simply due to defective nutrition. It is an atrophy. Agrees with Dr. Swain that though we might know all the science, we are of no account as dentists unless we are fine mechanics. Has set several of the Richmond crowns with satisfaction, except in one case, in which the trouble was occasioned by irritation produced by the oxy-chloride of zinc used in setting it. Patients seem much delighted with the operation, it being usually made in cases in which they had supposed that nothing could be done.

Dr. HURTT had some trouble last year with a broken inscisor. The patient would not consent to building down with gold, and it was broken too near the cutting edge to admit of using a tooth with pins. Fitted nicely a portion of a porcelain tooth, and in a dove-tailed slot upon the lingual side fitted a three-cornered gold pivot, fastened the gold in the porcelain with Hill's stopping, and set in the tooth with oxy-chloride of zinc.—[*Trans-Ills. State Dental Association.*

ST. LOUIS DENTAL SOCIETY.

RUBBER-CORUNDUM DISKS, WHEELS AND POINTS.

BY JOHN G. HARPER, D. D. S., St. Louis.

[Read before the St. Louis Dental Society, January 20, 1880.]

GENTLEMEN:—You can all recall the great satisfaction you have felt on being supplied with an instrument of which you have long felt the need; therefore, I wish to explain to you a simple process for making rubber-corundum disks, wheels and points. You can

supply yourselves with a better set of finishing instruments by the use of a little time and energy, than by the expenditure of your hard earned cash at dental depots. I make most of my instruments, for grinding smooth the surfaces of teeth, and the finishing of fillings.

Will now proceed to give my method for mixing the materials and forming the different instruments. You will find whalebone rubber best, as it is softer and more adhesive when heated to the proper temperature. Corundum powder, No. 100, is a good size to use.

Now we have the materials selected necessary for the preparation of the mixture.

The only tools, needed are a marble slab and a round bottle. First heat the slab to about 180° F.; to judge the temperature without the use of a thermometer, the sense of touch will do, as the heat should be as great as can be borne by the naked hand.

Place the heated slab upon a table and place upon it a small quantity of the powdered corundum, say ½ oz.; spread over a surface as great as that of the rubber into which you wish to incorporate it. Take a strip of rubber, half an inch wide, and two and a half inches long, and place upon the powder; now roll the mass, turning the rubber from time to time, until the area of the rubber is twice as great as the original; double the piece so as to bring the powder into the interior, then roll out until the thickness is about No. 20 of the U. S. guage plate; this mass will be sufficient to make half a dozen disks of thickness of No. 23 U. S. guage plate and ⅞ of an inch in diameter.

The powder should be worked in until the mass is three times the weight of the rubber used.

The material is ready at this stage for packing. The next thing is to make the proper mould. A permanent mould may be made of brass, as the vulcanized disk can be removed from brass; if iron is used it is necessary to first line the mould with heavy tin foil; if too thin foil is used, it (the foil) cannot be removed easily. The most simple way is to vulcanize the rubber-corundum in sheets between two pieces of smooth glass, which may be properly packed in a rubber flask so that in separating, a piece will remain in each part.

The glasses may be kept the required space apart by placing between them pieces of sheet tin or brass, of the same thickness as is desired in the disks.

Cut, with a pair of shears, a circular sheet of the prepared rubber, equal in diameter to the disk you wish to make; in the center of this place a circular piece of *fine brass gauze* one-half the diameter of the disk; this, and as many more as the space will permit, are placed between the glasses in the flask and closed in the usual way. Vulcanize forty-five minutes, taking thirty minutes to get the heat up to three hundred and twenty degrees; let cool off gradually. The wire gauze can be easily seen in the vulcanized rubber, and in the center of it drill a hole, and with a pair of compasses lay out the disk; this can be cut out with a pair of dull shears.

Mount the incomplete disk on a parting-nut mandrel, and place in the dental engine or laboratory lathe, and turn to a circle by holding against the rapidly revolving disk a piece of very coarse sandpaper.

If you have not a pair of compasses convenient, a model disk of sheet zinc, brass or tin, may be turned upon the dental lathe, and this used as a guide in cutting out the disk. Lay the model upon the sheet of corundum-rubber so that the holes come together through which pass a mandrel to hold in position, and then cut out the disk and finish as directed. Wheels, cones and points of any desired form may be made by first making a model of plaster of paris and getting an impression in two parts by pressing the model one-half its size into soft plaster of paris contained in one part of a rubber flask; after the plaster becomes hard, trim and soap or varnish, and fill the remaining part in the usual way.

As the models have been mounted, the mandrels are not removed, but the whole invested, open the flask and remove the plaster, model; when the investment has hardened, pack with the rubber-corundum and vulcanize the usual time. Any inequalities can be ground away with a corundum wheel. Fine polishing instruments are made by using *pulverized pumice stone* instead of the corundum powder.

The disks cut best if run very rapidly and kept wet, using but little pressure.

Mandrels can easily be made of *brass wire* the proper size; these

will not rust and become fastened in the hand piece, should one of them be accidently left in for any length of time. Small cylinder shaped points, mounted on short mandrels, and used in the *right angle attachment*, are excellent for grinding smooth the margins of cavities in the posterior teeth; the same shaped points used with the plain hand-piece, can be used in the anterior teeth when admissable. Small pencil-like points can be used in many cavities, and will make better margins than can be attained in any other way.

DISCUSSION.

DR. BOWMAN said: I have used the disks made by the essayist, and can safely say they are the best that can be had, and he knew of others that could say the same. He mounted small pieces of broken disks on fine pointed mandrels, and turned to the desired size; these were superior to small burrs for grinding out fissures and finishing fillings in fissures. Also used, almost exclusively, points made of rubber-corundum, or corundum for finishing fillings.

DR. MORRISON had used rubber-corundum with great satisfaction, in the form of disks and points. For making a slight separation between the teeth, he used a disk of *Daguerreotype metal*, charged with diamond dust. He mixed the dust with a little oil and gave the disk one revolution in the mixture, which charged the wheel sufficiently for an ordinary separation.

DR. EAMES had given up the use of the disks, as they were so easily broken, but as that objection had been removed, by the impacting of the brass gauze, he would return to the use of them.

DR. PATRICK said that the lapidary used soft steel disks, charged with diamond dust, for slitting the precious stones, and that the older the disk became the more valuable they were, for the reason that the surface became better charged with the diamond dust.

DENTAL HEMORRHAGE.

M. Hemard, principal medical officer at the Military Hospital at Versailles, forwarded to the Societe de Chirurgie the account of the case of a man in whom, after the extraction of the second upper left molar tooth, hemorrhage persisted from June 30 to July 8, in spite of plugs, compression, actual cautery, etc. The man having become very feeble, the left common carotid was tied, with the effect of repressing the dental hemorrhage, frequent capillary hemorrhages, however, taking place from .the wound. The ligature came away on the thirteenth day, but the wound had not completely cicatrized by October. The patient under tonics gradually recovered. The urine contained albumen and an excess of phosphates. M. Tillaux, in the discussion which ensued, expressed his doubts whether all had been tried before the ligature was resorted to. He had met with a case occurring in a student, in which he arrested the bleeding by plugging the alveolus with wax and causing digital compression to be made on this for about twenty-four hours by relays of friends. Cotton plugs imbibed with the perchloride may also be used in the same way, preceded or not by the cautery. If ligature were deemed necessary at all, the external carotid ought to have been tied, as danger from secondary hemorrhage is much less. On this point Prof. Verneuil quite agreed with M. Tillaux. He attributed the hemorrhage to the albuminuria, and it was in fact only arrested when quinine was given. To a student who had repeated dental hemorrhages he gave fifteen grains of quinine at a time, and that stopped the bleeding definitely. In all such cases quinine should first be tried. M. Magitot considered a plug formed of gutta-purcha mingled with charpie or cotton as far superior to one of wax. It is elastic, and retains its place in the alveolus without any digital compression. He has never met with dental hemorrhage that could not be so arrested. Prof. Leon Lefort also blamed the preference given to the common carotid, and much prefers M. Magitot's plug, which adheres to the walls of the alveolus, to the wax plug, which allows the blood to pass by its sides. M. Despres, however, stated that he had several times succeeded with the wax plug, taking care that the patient should keep compression upon it by means of his jaws.

At a subsequent meeting of the Societe de Chirurgie, Dr. Magitot stated that in the account which he gave of the great efficacy of the gutta-percha plug, he had forgotten to mention that before its application the socket should be thoroughly washed out with chloroform. This dissolves gutta-percha and facilitates its adhesion; and so close is this adhesion sometimes, that two or three days after the application of the plug it requires a true forceps extraction for its removal. This preliminary application of chlorform must, therefore, never be omitted, or the plug will sometimes prove no more efficient than the old-fashioned one of wax. How serious a matter dental hemorrhage is may be judged of by the fact that M. Moreau has recently reported ten cases in which it proved fatal.—[*Medical Times and Gazette.*

MISCELLANY.

TOXIC EFFECTS OF TEA.—1. With tea, as with any potent drug, there is a proper and improper dose. 2. In moderation, tea is a mental and bodily stimulant of a most agreeable nature, followed by no harmful reaction. It produces contentment of mind, allays hunger and bodily weariness, and increases the incentive and the capacity for work. 3. Taken immoderately, it leads to a very serious group of symptoms, such as headache, vertigo, heat and flushings of the body, ringing in the ears, mental dullness and confusion, tremulousness, "nervousness," sleeplessness, apprehension of evil, exhaustion of mind and body, with disinclination to mental and physical exertion, increased and irregular action of the heart, increased respiration. Each of the above symptoms is produced by tea taken in immoderate quantities, irrespective of dyspepsia or hypochrondria, or hyperæmia. The prolonged use of tea produces, additionally, symptoms of these three latter diseases. In short, in immoderate doses, tea has a most injurious effect upon the nervous system. 4. Immoderate tea drinking, continued for a considerable time, with great certainty produces dyspepsia. 5. The immediate mental symptoms produced by tea are not to be attributed to dyspepsia. In the above experiment upon myself, the whole group of

symptoms was produced, with no sign of digestive trouble superadded. 6. Tea retards the "waste," or retrograde metamorphosis of tissue, and thereby diminishes the demand for food. It also diminishes the amount of urine secreted. 7. Many of the symptoms of immoderate tea drinking are such as may occur without suspicion of tea being their cause; and we find many people taking tea to relieve the very symptoms which its abuse is producing. —[*Journal of Nervous and Mental Diseases.*

OFFICE OF THE QUEEN BEE.—Many have asked the question, "Does the queen govern the colony?" We answer, No. The economy of the colony is directed by the workers. It seems that the only necessity of the queen is to supply the hive with eggs, and the colony is entirely dependent on the queen for this. Curiosity has prompted me to scrutinize this subject very closely, and I am free to confess that I have failed to discover that she performs any other office in the hive except the one mentioned. I never discovered that she possessed any care of her offspring; not even manifesting any parental care whatever for their welfare; in fact, the workers, as a general thing, supply her with honey and other food necessary to sustain her, and it is the food in a very great measure, both quality and quantity, that stimulates the queen to breeding rapidly; and this food, as given by the worker, greatly affects the production of eggs, either to increase or diminish the quantity. I think she has the power of regulating the amount of eggs necessary for the safety of the colony; when honey is abundant she will lay profusely, evidently having the power of regulating or repressing the development of her eggs. She will diminish the number and almost cease laying, and when circumstances require she will at once engage in active labor, depositing either in worker or drone cells, as circumstances may require. The eggs in drone cells, are deposited in the season when such are required—generally commencing from the 1st to 10th of April—but this depends greatly on the season. If the swarm be strong and honey plenty in the forest, she is actively engaged in laying both in worker and drone cells; she evidently understands her business—nothing done at

random. A fertile queen is one that has paired with the drone or male bee, and is capable of laying eggs that will produce workers, drones, or queens. Barren bees are often found in the hives. A queen's fertility lasts from three to five years, and then the workers frequently destroy her, and rear another. They are sometimes superseded when from two to three years old.— *F. Moon, in the Bee-Keepers' Magaziue.*

A QUACK'S EXODUS.—The State Board of Health for Massachusetts, in their tenth Annual Report, direct the attention of the State Legislature to the experience of Illinois, where, in one year and a half, 1,400 self-styled doctors are reported as having left the State, because they were unable to pass the examination required of them. Of these, 400 are estimated to have gone to Indiana, 250 to Wisconsin, 100 to Minnesota, and an unestimated number to Missouri.—[*Med. Press and Circular.*

DELICACY OF THE MINT SCALES.—The fine gold-weighing scales made in Philadelphia for the New Orleans mint, and placed in position recently, are marvels of mechanical invention and accurate workmanship. The larger of the two has a capacity of ten thousand ounces troy, or about six hundred and eighty-six pounds avoirdupois, and, when loaded to its full weight, will indicate a variation of one-thousandth part of an ounce, or the millionth part of its weighing capacity. Another pair of scales is the one intended for weighing gold only. It has bearings composed of the finest agates, which have been ground with wonderful precision. So delicate is this machine that it will give the precise weight of a human hair, and is susceptible to the slightest atmospheric changes. Millions of dollars' worth of precious metals will be weighed annually upon these scales.—[*New Orleans Times.*.

EXAMINATIONS FOR DEGREES IN ENGLISH MEDICAL SCHOOLS.—The last statistics of the past examinations in the nineteen British medical schools shows the following per-centage of rejections. The

average of the rejections in the London Schools is 31.3 per cent. That of the provincial schools is 35.6 per cent. The rejections at the primary examinations are about 30 per cent. There are very few American colleges that have so large a per centage as this, although exact statistics cannot be obtained. In many large schools there is a desire to graduate as large a number as possible. The faculties hesitate to publish the number of applicants because they reject so few of them. There is a tendency just now, however, to increase the per-centage of rejections.—[*N. Y. Medical Journal.*

IMPENDING DEATH FROM CHLOROFORM.—For the removal of a pea from the external auditory canal, a boy æt. 8 years was narcotized with chloroform. Although only 30–35 drops were administered on a cloth, complete anæsthesia was soon induced and the pea was readily removed. At this moment respirations and cardiac pulsations ceased. Affusions with cold water, artificial respiration, inhalation of ammonia, all were resorted to without avail. Twenty-five minutes had thus been passed in making fruitless efforts when the boy was suspended by his heels and the body gently swung. Very suddenly a congestion of the face was observed, and the patient gave utterance to anxious groans; he was saved.—[*Spörer St. Petersb. Med. Wochenach*, No. 30, 1879. J. R.

M. Maas, of Fribourg, has made a series of researches on the absorbing power of wounds, and the results which he has arrived at are partly opposed to the opinion admitted up to the present. A wound cauterized with the hot iron, nitrate of silver or nitric acid, absorbs like an intact wound; the absorption is much more rapid if the wound has been in contact with carbolic acid, as in Lister's dressing; it is nil in cases of cauterization with chlorate of zinc. In wounds treated openly, a crust is formed which at the end of six hours is impermeable; it becomes so only at the end of three days if the wound has previously been covered over with a wet dressing. —[*Le Frog. Med.*

FROM experiments made by Arloing, it appears that chloral does not act as an anæsthetic on the sensitive-plant, while ether and chloroform have an effect upon it similar to that which they exert on animals. M. Arloing in his experiments caused the anæsthetics to be absorbed by the roots of the plant.

STAMMERING.—M. Chervin read a paper on this subject at the last meeting of the International Medical Congress. From an extended study of the affection, he comes to the conclusion that it is, in most cases, due to a central lesion which causes a deficiency in the power of coördinating the muscles of speech. His treatment is, first, a week of complete silence, then to make the patient read aloud slowly for a time, then to make him speak very slowly, gradually increasing the rapidity of utterance. With this plan he claims to have had uniform success.

TO ATTAIN LONG LIFE.—He who strives after a long and pleasant term of life, must seek to attain continual equanimity, and carefully to avoid everything which too violently taxes his feelings. Nothing more quickly consumes the vigor of life than the violence of the emotions of the mind. We know that anxiety and care can destroy the healthiest body; we know that fright and fear, yes, excess of joy, become deadly. They who are naturally cool and of a quiet turn of mind, upon whom nothing can make too powerful an impression, who are not wont to be excited either by great sorrow or great joy, have the best chance of living long and happy after their manner. Preserve, therefore, under all circumstances, a composure of mind which no happiness, no misfortune, can too much disturb. Love nothing too violently; hate nothing too passionately; fear nothing too strongly.—[*Exchange.*

OBITUARY.

SAMUEL STOCKTON WHITE, D.D.S.

DIED, at Paris, France, December 30, 1879, of congestion of the brain, Dr. SAMUEL S. WHITE, in the fifty-eighth year of his age.

This intelligence of the sudden and unexpected termination of the career of one who seemed but a few days ago to be in the fullness of his strength, will be received with a sorrow equal to the sad surprise. Although he had so long since attained the leading position which he occupied, we naturally looked forward to many more years of usefulness for him in the work he loved so well, and in the duties which he discharged so faithfully. A life adorned by personal virtue, consecrated to worthy aims,— a life of usefulness to the world, and especiallv to the profession of dentistry,—is thus untimely ended.

About the middle of November he had a slight congestion of the brain, from which he recovered quickly, but which was accepted by his physicians as an indication that he must at once seek a long-needed rest. In company with his son and daughter, and attended by his nephew, a physician, he sailed for Europe on November 19. He seemed to be rapidly gaining health and strength, until a little before Christmas a second attack of congestion occurred, to which he succumbed on the 30th of December. His remains were forwarded to his home, and, attended by his sorrowing family and friends, were consigned to the bosom of our common mother earth on the 19th day of January.

Samuel S. White was born at Hulmeville, Bucks County, Pennsylvania, June 19, 1822. He was the eldest child of William R. and Mary (Stockton) White. His father died when he was eight years old. Soon afterwards his mother with her children removed to Burlington, New Jersey, were he resided until, at the age of fourteen he was indentured to his uncle, Samuel W. Stockton, of Philadelphia, whose manufacture of mineral teeth was the first in the United States to attain any commercial importance, to learn "the art and mystery of dentistry and the manufacture of incorruptible teeth."

On attaining his majority he commenced the practice of dentis-

try in his uncle's office, and at the same time superintended his manufacturing department. In the following year (1844) he began the manufacture of teeth on his own account, in the garret of a dwelling-house at Seventh and Race Streets, uniting with it the practice of dentistry in an office in the same building. This was the initiatory step in an enterprise which has since grown to be the largest of its kind in the world. In a short time he removed to Race Street above Eighth, continuing both branches of his business. In 1845 he took in as partners Asahel Jones, of New York, and John R. McCurdy, of Philadelphia; in 1846 he relinquished the practice of dentistry in order that he might devote his entire time to the manufacture of porcelain teeth. The firm remained on Race Street tlll 1849, when it removed to a property on Arch Street below Sixth, which had been purchased and fitted up to accommodate the increasing business. In 1852 another removal to a still more commodious structure two doors below was necessitated. Branch houses were established, in New York in 1846; in Boston in 1850; in Chicago in 1858. Mr. McCurdy withdrew in 1859, and in 1861 Mr. Jones also retired, Dr. White purchasing the interests of both. In October, 1868, the imposing structure at the southeast corner of Chestnut and Twelfth Streets, which had been erected by Dr. White, and fitted up expressly for the purpose, was occupied as a manufactory and depot.

Dentistry as a fine art may be said to date its beginning from Dr. White's entrance into business. The profession was in its infancy. The porcelain teeth which up to that time had been placed upon the market were in all respects but wretched imitations of the natural organs. To his persistent sagacious efforts to produce better results, were due the wonderful advances attained in the teeth of his manufacture even thirty years ago.

The improvements in mineral teeth with which his name stands credited are numerous and important,—steady approaches toward perfection in many and various details. The older members of the profession will recall the progress made from time to time—the obstacles encountered and overcome: The translucency gained without the sacrifice of strength; the increased capability of resisting changes of temperature; the added strength with lessened bulk and weight; the modifications with special reference to the comfort

of the wearer; the distinctions in shape in accordance with anatomical types; adaptability to varying conformations of maxillæ; the recognition of the artistic demands in replacement—the distinctive needs of differing sex, age, complexion, nationality, and general physical peculiarities; the faithful reproduction of the manifold deviations from absolute uniformity, including the minor as well as the more noticeable features, effects to disarm suspicion of artificiality, and forms to overcome the results of irregular or excessive absorption without violating asthetic requirements; improvements also in the mechanics of substitution,—the means of attachment to the various bases—the bell-shaped, the double headed, and the foot-shaped pins, and modifications of form specially applicable to the different materials used as bases.

When the improvements above enumerated, and many others not specified, are considered, it must be conceded that the advances in dentistry as a prosthetic art from 1844 to the present time have been due in very great part to the steady approximation to perfection in all the essential characteristics of artificial teeth which the manufactures of Dr. White have so constantly maintained.

In February, 1847, the first marked recognition of his efforts was received,—a testimonal signed by many of the leading dentists throughout the country. This was followed, in 1848, by a gold medal, awarded by the American Institute of New York, and the first premium by the Maryland Institute of Baltimore. In 1849 a premium of a gold medal for the greatest improvement in the manufacture of porcelain teeth, offered by the Pennsylvania Society of Dental Surgeons, was awarded to him. From that time to the present no year has passed without testimony to the superiority of his manufactures in one respect or another, until medals and diplomas—aggregating now nearly fourscore—from all the principal industrial institutes of the country and from all the great international exhibitions, confirmed the position which he early attained as the leading manufacturer of artificial teeth in the world.

Not alone, however, in the special department of porcelain teeth did his manufactures hold unquestioned pre-eminence. In its early days the practice of dentistry was more a secret art than a broad science. At the time Dr. White began to supply the wants of the profession, dentists had only just begun to make public the results

of their experiments and investigations. There were no manufactories of instruments for their special uses. Such as were made for sale were supplied by the surgical-instrument makers, and included only the simplest appliances; for the most part individual dentists made their own tools. As a consequence, those which had been found useful by any one practitioner were confined chiefly to his own office or laboratory; but as their advantages became known, the desirability of placing them within the reach of others made the establishment of a manufactory of instruments specially adapted to the needs of the dentist a necessity. With characteristic sagacity Dr. White met this want, and this branch of the business extended, until the reputation of the dental instruments bearing his trade-mark became as wide spread as that of his porcelain teeth. It is a remarkable fact and the strongest evidence of their superiority, that they hold as high a place in the esteem of the dental profession of Europe as in that of American dentists.

In appointments and appliances for the office and laboratory the various and steadily-growing needs of dental practice were constantly met,—and in an art so largely manipulative as dentistry the facilities and implements with which it is furnished have much to do with its success. In the rapidly succeeding improvements in dental engines and chairs, his unflagging zeal was shown by a series of triumphs which overcame all obstacles and produced results which commanded the admiration of all who appreciated their wonderful adaptation to the purposes which they were meant to serve. It seemed to be his mission more than that of any other man to lead and educate the profession to an appreciation and employment of time and health-saving instrumentalities. He not only stood ready to meet its every demand, but seized upon and fostered every suggestion, resting only when the ideal became the actual. His ambition for progress and improvement led him to stimulate dental inventors, until the genius that conceived the thought rejoiced in its fruition. Thus it may be truly said that to a large extent he created the market which he supplied.

In the field of dental literature, the publication of the " Dental News Letter " for twelve years, commencing in 1847, and following it, of the " Dental Cosmos," now in its twenty-second volume, has

had no small share in the growth of the profession in usefulness, self-respect, and public regard.

It will scarcely be disputed by any one familar with the history of dentistry for the past forty years that in many directions no one man has exercised a wider or greater or more lasting influence upon its development, not alone in this country, but throughout the world, than Samuel S. White.

He took an active interest in all that concerned the dental profession; identified himself with it and gave to its advancement the best efforts of his life. Though already overburdened with business cares, he accepted the leadership of an opposition to exactions by the Goodyear Dental Vulcanite Company, which he conscientiously believed were founded on an indefensible patent. His services and sacrifices in the position which was thus almost thrust upon him should be long and gratefully remembered by the profession in whose interest he acted, as, whether right or wrong, successful or otherwise, he was honest and earnest in his efforts in the legal contest of their claims, involving himself in personal suits for slander and "maintenance" with damages laid at $175,000.

This brief memoir would be incomplete without a mention of his readiness to lend a helping hand to inventions and enterprises outside of his own business. He early became interested in the Harmoni Telegraph, and assisted Elisha Gray, its inventor, with the means necessary for its development. He never wavered for a moment in his faith in its ultimate success, or hesitated to furnish the required means promptly as called for. He was also a large stock-holder in the American Speaking Telephone Company,—an outgrowth of the Harmonic Telegraph,—and gave much time and thought to prevent litigation about rival claims, and was largely instrumental in the adjustment and consolidation of opposing interests.

He was a patriotic and public-spirited man,—the first in America to respond to the call of the government for a loan in its early struggles with the rebellion. He was a humanitarian and a liberal helper in philanthropic efforts, disbursing continuously for many years with an unstinting hand in aid of charitable objects. He was a worker in the great Sanitary Fair, and one of those who subscribed five thousand dollars each towards the Centennial Exhibition.

He was a member of the Union League, of the Reform Club, the Franklin Institute, the Academy of Natural Sciences, the American Association for the Advancement or Science, the United States Board of Trade, and many other business and benevolent associations.

As a man he was modest and unassuming, charitable and respectful to others, yet never forgetful of self-respect; courteous, cordial and simple in his manners, uniting dignity and urbanity. Few men are to be found more free from faults, and none of greater probity or purer designs and aspirations; calm in danger, cool under difficulties, wise in council, a kind husband, an indulgent father, thoughtful and considerate as an employer, a steadfast friend, a diligent worker, a man whose word was as good as his bond.

He believed that religion was a life, not a ceremony,—a love of good and a hatred of evil. All his actions were regulated and subordinated by this conviction. Industry, honesty, truthfulness, integrity, justice, forbearance, forgiveness, benevolence and love characterized his life. Service was to him easy, sacrifice a pleasure, and duty a delight. He was a manly man, possessed of "the manliness of love, the manliness of truth, the manliness that wears the spirit on the brow, the manliness that bears the heart in open palm, no plan or purpose that he feared to show." His motives were pure, his ambitions noble, his mind devoted to truth, his conscience pledged to the right.

We shall miss his kindly greeting, his ready hand, his sympathizing tear, his generous heart, his upright walk, his noble example worthy of imitation; but his influence, though unseen, will be felt and transmitted to generations which knew him not; and although passing away at a comparatively early age, yet reckoned by the work he has done instead of by the years he has counted, he may be said to have attained the fullness of life.—[*Dental Cosmos.*

CHICAGO DENTAL SOCIETY.

At a meeting of the Chicago Dental Society, held January, 1880, the following resolutions were unanimously adopted:

WHEREAS: The painful intelligence has reached us, that DR SAMUEL S. WHITE has with appalling suddenness, taken his leave of earth and earthly things, be it therefore—

Resolved: That in his death the nation has lost one of its most energetic, useful and upright citizens; and that the Dental Profession has been bereft of its noblest benefactor and best friend—one who in the prosecution of his extended enterprises, advanced the Art, and by his liberality fostered the Science of Dentistry.

Resolved: That this society is especially indebted for the many kind favors which he has bestowed upon it, from its first organization up to the present time; and that its members deplore his loss, both as a personal friend and as a gentleman who has been ever true and generous to the profession of his early adoption; and that we will cherish his many noble qualities in ever-grateful remembrance.

Resolved: That we extend to his bereaved family our most sincere and heartfelt sympathy for the great affliction which they have sustained.

SAINT LOUIS DENTAL SOCIETY.

The following resolutions were passed by the St. Louis Dental Society, February 3, 1880.

Your committee to whom the preparation of resolutions expressive of the sentiment of this Society on the death of Dr. Sam'l S. White was referred, respectfully report as follows:

WHEREAS, Knowledge of the death of DR. SAMUEL STOCKTON WHITE, of Philadelphia, has been received by this Society with profound regret, the painful nature of the intelligence being greatly increased by the startling suddenness of the event, therefore

Resolved, That in his death the Dental Profession has lost one of its most efficient promoters, and the public at large a respected and most usefnl citizen.

Resolved, That for justice, liberality, integrity and efficiency, Dr. White stands unsurpassed among his fellow citizens; and that to these qualities, joined to rare judgment, may be attributed his unusual success in a business career that has been alike remarkable for its wide extent and its highly honorable character.

Resolved, That we hereby tender to his bereaved family our heartfelt sympathy and condolence in their severe affliction.

Resolved, That a copy of these resolutions be sent to the family of the deceased, and to the Dental Journals for publication.

Prof. Wright, who recently died at his home in Cincinnati, will long be remembered as a medical teacher, lecturer, writer and practitioner. The cause of death was the impaction in the œsophagus of a plate of gold containing an artificial tooth.—[*Med. Press and Circular.*

BOOK NOTICES.

TRANSACTIONS OF THE AMERICAN MEDICAL ASSOCIATION FOR 1879.

This is a very handsome volume of more than 1,000 pages, containing a large amount of very valuable matter. The prize essay of Allan McLaine Hamilton, M. D., of New York, on Degeneration of the Lateral Columns of the Spinal Cord, and the profusely illustrated article by Lewis A. Sayre, M. D., of New York, on the treatment of Spondylitis by Suspension and the Plaster of Paris Band age, are papers whose worth can scarcely be overestimated. The volume is of unusual interest, and should be carefully studied by every lover of medical science.

THE MOUTH AND THE THE TEETH. BY J. W. WHITE, M. D., D. D. S.

This is the seventh number of the Series of American Health Primers, published by Messrs. Lindsay & Blakiston, of Philadelphia. It is well written and covers the whole subject of popular knowledge concerning the teeth. It treats of the Anatomy, Development and Eruption of the Teeth; Care, Shedding and Nutrition; also Constitutional Peculiarities, Irregularities, Decay, Toothache, Artificial Substitutes, etc., etc.

As an educator of the people on subjects relating to the teeth, the book is a most excellent one, and will doubtless have a wide circulation.

VICK'S FLORAL GUIDE. Published by James Vick, Rochester, N. Y.

Of the many Guides and seed and plant catalogues sent out by our Seedsmen and Nurserymen, and that are doing so much to inform the people and beautify and enrich our country, none are so beautiful, none so instructive as *Vick's Floral Guide.* Its paper is choice, its illustrations handsome, and its colored plate is a gem. This work, although costing but five cents, contains several hundred illustrations, and is handsome enough for a gift book, or a place on the parlor table.

BOOKS AND PAMPHLETS RECEIVED.

ARTIFICIAL TEETH. Things to be thought of by those who wear them. By L. P. HASKELL, Mechanical Dentist. 125 State street, Chicago,

ADDRESS OF S. W. DENNIS, M. D, President of the California State Dental Association, May 13, 1879.

TRANSACTIONS OF THE CALIFORNIA STATE DENTAL ASSOCIATION, for the years 1875-6-7-8 and 9.

CATALOGUE OF MEDICAL AND DENTAL BOOKS. Published by LINDSAY & BLAKISTON, Philadelphia, and for sale by Booksellers.

EDITORIAL.

The beginning of the year 1880 is celebrated by the appearance of two new dental monthlies. One, the "Dental Jairus," is edited and published by W. O. Thrailkill, D. D. S., of Sacramento, California.

Dr. Thrailkill says: "When our 'Sample Number' was published in September, we fully expected to publish again ere this, but after reflecting on the matter, we thought best to delay the publication until this date; that each volume might commence and end with each year. Succeeding numbers will appear on the first of each month hereafter.

"Since our 'Sample Number' appeared, we have received many letters of commendation from all over the coast, and several from other parts; all unite in wishing us 'Success,' 'God Speed,' etc. Hence, we feel that our efforts in thus starting and publishing the first Dental Journal ever published on the Pacific Coast, have not been in vain, but that, this our educational strife, will be fully appreciated and liberally rewarded."

We are glad to see dental journals multiplying, and wish our Pacific co-laborer abundant success.

The other is called the "Practitioner," and does not claim to be exclusively a dental journal, but an "Independent Monthly devoted to Medical, Surgical, Obstetrical and Dental Science." That is, it is a Medical and Dental journal combined. It is edited by Harvey L. Byrd, A. M., M. D., and Basil M. Wilkerson, D. D. S., M. D., and is published by the latter at Baltimore, Maryland.

The uniting of medicine and denistry on an equal footing in one periodical, is a new feature in professional journalism, and must be regarded as an experiment, having a somewhat problematical result. Much will of course depend upon the ability with which it is conducted. Yet we cannot be oblivious to the fact that the present tendency in journalism, as in all things else, is to divide rather than diversify. The independent character of this journal will go far in commending it to the more thoughtful and intelligent minds in our own profession, and we sincerely hope it will attract sufficient patronage to make it a permanent success. The dental profession is now large enough and strong enough to sustain an independent periodical literature, that shall be subscribed for and read for its intrinsic worth. Formerly this was not the case, and the profession is largely indebted to the enterpise of manufacturers of dental goods, for the existence, as well as the present high standing of the older periodicals devoted to our specialty. We do not expect any sudden change in the management of dental journals, but we do look for the gradual development of a preference for a class of perodicals that are strictly professional, and that are wholly independent of mere business alliances.

The name of the Baltimore journal seems to us not to be as well chosen as it might have been, owing to the fact that there are already several medical journals in this country bearing the same name. However, the name is of secondary importance; "a rose by any other name, etc;" the substance being that upon which its readers will estimate its value. We cordially extend the hand of fellowship to this new candidates for professional favor.

THE UNIVERSAL BATH.—This bath has been advertised in our columns for several months, and having taken time to test its qualities, we unhesitatingly recommend it as being all that is claimed for it by the manufacturer. Portable, light, adjustable, economical in the use of water and very convenient and effective. Even where fixed baths are at command, the invalid will appreciate the convenience and greater safety of having a bath brought to the bedside. where the ordinary bath is inadmissable, owing to a limited supply of water, this bath will meet an hitherto unfelt want.

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VEGETABLE RESPIRATION.

BY THE EDITOR.

This paper is written not with the view of presenting anything particularly new, but for the purpose of endeavoring to correct the common yet erroneous ideas concerning plant respiration. The leaves are usually spoken of as the lungs of plants. This term would not be objectionable were it not accompanied by a description, or by the conception of a process that is carried on in the leaves, which is anything but a respiratory process. Respiration consists of the inhalation of air for the purpose of supplying oxygen to the animal or vegetable tissues, and the opposite act of exhaling air for the purpose of taking away from the tissues carbonic acid; the carbonic acid being in the form of gas.

The process that takes place in the leaves of plants that is usually called respiration, is one in which the leaves absorb carbonic acid gas from the atmosphere, and give off oxygen.

We often hear parks and collections of trees spoken of as the

lungs of the city, and the reason given for that designation is that the leaves take carbonic acid from the atmosphere and thus purify it, at the same time giving off oxygen which is essential to the well-being, yea! even to the existence of men and animals, and I might add, *plants.*

This process is not respiration, but digestion. Food is what plants acquire by this act, for the carbonic acid thus withdrawn from the atmosphere is changed into carbon by a true digestive process, which like other nutrient products of digestion, becomes incorporated into the substance of the tissues.

Let us examine this process for a moment and see how it is conducted. The carbonic acid gas of the atmosphere comes into contact with the chlorophyl or coloring substance of the leaves, and by its action the gas is decomposed; that is, the carbon and the oxygen which compose the carbonic acid, are separated from each other, the carbon becoming fixed in vegetable structure, while the oxygen being set free, escapes into the atmosphere. The supply of carbonic acid in the atmosphere is constant; yet although the carbon c acid is ever present, and the leaves of plants are continually immersed in an atmosphere containing carbonic acid, yet this process is not continuous, but intermittent. It takes place only during the day, and is suspended during the night. This intermittent property is owing to the fact that the stimulus of light is requisite to enable the chlorophyl to separate the carbon and the oxygen. Artificial light will not excite this action, and hence plants sleep in the presence of artifical light. Moonlight, which is only reflected sunlight, may effect this change to a very small extent. But broadly stated sunlight is necessary that the chlorophyl may exert its decomposing powers. This process goes on at a speed corresponding with the intensity of the light. Hence tropical plants absorb carbon more rapidly than do those of temperate regions, and these again more rapidly than do those of colder climates. It is for this reason that tropical plants, and especially tropical fruits, when grown under glass in northern latitudes, are inferior to those matured in their native habitat. The required temperature can be supplied artificially, but the amount of sunlight is insufficient for the requirements of these plants, and artificial light cannot be substituted. The agency of sunlight in vegetable growth is therefore directed

to the fixation of carbon in the vegetable structure; and this is one reason why animals are not so dependent upon its constant presence. Experiments show that the chemical change which results in the fixation of the carbon and the liberation of the oxygen, is due to the action of sunlight. "Put a fresh leaf into water exposed to sunlight, and oxygen gas will escape from it in bubbles. Shade it, and the disengagement immediately ceases. The greater the force of the sun's ray, the greater the speed at which the vegetable machinery is driven."

The proportion of oxygen in carbonic acid is twice as great as is that of carbon; and the proportions are not changed by the conversion of carbonic acid from a crystalline to a gaseous form. Hence it is evident that the rapid absorption of carbon that takes place under the stimulus of sunlight is accompanied by the evolution or liberation of a much larger amount of oxygen.

It is well known that carbon is one of the principal substances that enters into the composition of vegetable tissue. It is also known that the chief source of the carbon is the atmospheric air.

Now, as carbonic acid is not an element of pure atmospheric air, the question naturally arises, from what source does the atmosphere derive its supply? The common answer is, it is exhaled by animals. That is true, but did not plants exist upon the earth before animals? And if so, whence came the carbonic acid that these earlier plants fed upon? I shall not attempt to discover the source from which those very simple and lowest forms of vegetable life, which first appeared upon our earth, derived their carbon. It may have been furnished by some method unknown to us, and that is yet to be discovered. The point that I wish to bring to your notice at this time is, that carbonic acid gas is exhaled by plants as well as by animals—that true *vegetable* respiration is attended by the absorption of oxygen, and the giving off of carbonic acid, equally with *animal* respiration, the difference being only in degree.

That plants imbibe oxygen, and emit carbonic acid, has been abundantly shown by careful experiment. If we deprive a plant of oxygen it perishes, and although an undue accumulation of carbonic acid in the atmosphere is not so destructive of vitality with plants as in the case of animals, yet a healthy condition of every plant demands that provision shall be made for the escape of car-

bonic acid. Plants cannot long survive in an atmosphere loaded with carbonic acid gas, but soon suffocate and die, and this less quickly but just as surely as in the case of animals.

The imbibation of oxygen and the emission of carbonic acid constitute vegetable respiration, just as the same process in animals constitutes animal respiration.

Having shown that the vegetable process, commonly called respiration, is a digestive proceeding, let us turn our attention to the real act of vegetable respiration. This act is performed by the agency of the entire surface of the plant, which is surrounded by atmospheric air; hence by the bark and leaves. Actively by the leaves and the fresh bark of young shoots, and less actively, but still constantly, through the older bark which covers the trunks and larger limbs of trees.

Beneath this older bark is a layer of young bark, which not being in actual contract with the air is somewhat hindered in its respiratory functions by the covering of older bark which surrounds it. This covering is, however, very porous, and air passes through it without serious difficulty.

The epidermis, or skin, of plants is composed of cellular tissue, and envelops the entire plant, except the stigma of the flower and the terminal or absorbing points of the roots. The cells composing the tissue contain air, and the air is renewed or changed to an extent equal to the requirements of respiration. These air cells correspond to the air vesicles in the lungs of animals, and are the vehicles through which the plant is supplied with oxygen. Usually there is but one layer of these cells that are engaged in discharging the respiratory function, but not infrequently there exists two or more layers. These air cells perform a double office, and while a single layer is sufficient for the performance of the respiratory function, the additional layers are useful in the additional function above mentioned. This second office prevents a too rapid evaporation of moisture from the substance of the plant, and when more than one layer is present, these layers being disposed one over the other, the hindrance to evaporation is increased. Plants having several layers suffer less from a deficiency of moisture, owing to diminished evaporation. For example, the oleander has the unusual number of four layers of cells, and for that reason endures drought to a remarkable extent.

Besides these air cells there are openings between the cells, which admit air and water to pass through the epidermic covering, and thus reach the underlying tissue. These openings or channels, however, are not constant. Their orifices are mostly open during the day, but close at night, when access to the underlying tissue by this means is suspended. Sun-light has the effect of opening these orifices, and in its absence they gradually close.

These channels always connect with passages in the tissue composing the substance of the plant, called intercellular passages, which lead into the compact tissue, and thus admit air and water into the deeper parts. Their orifices are very abundant all over the leaves, except on the midribs and veins, and also on the young shoots. A hundred thousand of them may occur within a square inch of surface. The similarity between leaf and bark is such that the leaf may be considered as a broad expansion of newly-formed bark.

Respiration takes place through the day by means of these openings, and also by means of the air cells. But during the night, when the orifices of these channels are closed, respiration takes place only through the air cells. This latter process goes on continuously day and night, summer and winter, for a plant cannot long survive the suspension of the respiratory office. The object of respiration is, first, to supply oxygen for the uses of the plant; and, second, to convey away the carbonic acid gas that is liberated by the changes which occur in plant food after it has been absorbed by the roots.

During the growing season more carbonic acid gas is absorbed by the leaves than is exhaled by plants; but the respiratory process, as I have said, goes on continuously, and the carbonic acid gas, exhaled in the intervals of growth, is distributed over the earth by winds and other atmospheric currents. The proportion in the atmosphere is thus equalized. During the growing season the roots absorb water containing more or less of plant food in solution. This fluid we call sap. It is carried to the leaves, and there undergoes digestion. Starch is a result of this process, but starch is not available as plant food. To render it available it must be changed to sugar. This is effected by the oxygen supplied by respiration, especially during the winter rest. The oxygen derived from the

air unites with a portion of the carbon contained in starch, and in that manner converts the starch into sugar; the resulting carbonic acid, formed by the union of the oxygen with the carbon withdrawn from the starch, is exhaled through the air cells, and thus returns to the atmosphere as carbonic acid gas.

Thus the great stores of starch that are accumulated through the growing season are gradually converted into sugar through the agency of respiration, while the plant is in a state of comparative rest. When spring returns, the starch laid up during the previous year has become soluble by reason of its conversion into sugar, and is ready to be used for the nutrition and growth of the plant. This process takes place in all perennial plants, but is more conspicuous in some plants than in others. It is notably the case with the maples and especially with the Acer Saccharinum and Acer Negundo.

The bark of evergreens is not so well suited for the respiratory process, and for that reason the leaves are retained continuously that respiration may not be interrupted.

AN ODONTOME.

BY G. V. BLACK.

[A Paper read before the Illinois State Dental Society, May. 1879.]

I have here an erratic formation, to which I wish to call the attention of the members of this Society for a few moments only. It is an Odontome, Odontomata or tooth tumor, or a tooth the formation of which is so faulty that it has not the appearance of a tooth. This specimen occurred in the practice of Dr. E. Duncan, of Jacksonville. The patient a man about twenty-five years old. It occupied the position of a second molar in the upper jaw, and had never given any serious trouble; but in the last few months had become loosened, and at last dropped out without any scientific aid whatever. Dr. Duncan had examined it a short time before this, while the Odontome was in position, and again examined the mouth a few days after it had dropped out, and found the wisdom tooth, which had been missing, making its appearance in the socket left by the Odontome. It is evident that the wisdom tooth had been detained by being beneath the Odontome. The other wisdom teeth

were all in their places, as were all the other teeth; they were well formed and free from decay. The health of the patient, and that of his family, had been good, and the teeth of all well formed.

When dry, the weight of the Odontome was 4.77 grains.

Measuring according to the situation in the mouth, it measures

24 millimeters from before backward,
20 " from side to side,
14 " from root to crown.

The upper or crown surface is oval, presenting no sharp angles, but is somewhat irregular in form; yet showing no appearance of normal cusps. From before backwards it is nearly flat from side to side; portions are quite smooth and covered with enamel, other portions rough and apparently without enamel. This upper surface or crown portion overhangs the lower or root portion a little all round the margin, and in most parts presents the appearance of an irregular junction of enamel with dentine.

The lower or root portion is generally flat, though quite irregular, presenting a number of depressions and elevations—notably one large depression in the center of the long diameter and the posterior half of the short diameter, which, from its form, would seem to have been moulded upon a prominent cusp of the coming wisdom tooth, upon which it seems to have fitted. Around this depression there were irregular protuberances, from two to four millimeters in height. The anterior third of this surface slopes up to the junction of the enamel, while the remaining portions, although quite irregular, rise pretty squarely to the junction with the enamel.

For the purpose of examining its structure, I have sawed it through, halving it in an antero-posterior-perpendicular direction, and cut some sections. I found all the tissues of a normally developed tooth, but in a state of confusion. There is entire absence of any proper pulp cavity.

The disposition or arrangement of the tissues is very peculiar and striking. It is as though there were a thousand little teeth, exceedingly minute, growing as close together as they could be crowded, and the interstices between them filled up with enamel and cement. In the field of the microscope, with the sections I have, we will often be able to see a number of these diminutive teeth at a single view; each has its own little pulp chamber in due form,

its own seperate dentine, and its own enamel cap, and plastered in and about, and added on to these, there is a considerable amount of both enamel and cement of very irregular formation. Very many of the pulp chambers are partially filled with calcosphereites. These also appear in many parts of the specimen in profusion.

It is interesting to note the resemblance of this Odontome to the normal structure of the teeth of some of the lower orders of animals, especially some species of fishes, in which there are branching and radiating pulp cavities. These forms are well described by Charles Tomes.

These forms of Odontomata are exceedingly rare, if we may judge from the reports we have thus far been able to find; yet it is important that they be properly understood when they do occur, for they do not always drop out of themselves as this one has done, but are inclined to give very serious trouble. We will give a condensed resume of the cases reported thus far; that is, all that have come under our notice. In doing this, we exclude everything except the complete malformation of both root and crown. They seem to constitute a distinct type, and are more properly *dental tumors* than malformed teeth, and therefore merit the name of Odontomata or Odontome, which we do not think should be applied to simple misshapes of the teeth.

CASE 1. Reported by Dr. Jarish, etc. (from Wedl)—Patient, female, 25 years old, weak of body. A tumor was noticed on the back part of jaw. Inflammation occurred, with formation of abscess. A malformed tooth was removed with forceps.

CASE 2. Reported by Prof. Strasky, of Lundberg—Patient 20 years old. Presented tumor on right cheek of several weeks' duration; difficult deglutition and much pain; the jaws were opened with difficulty sufficiently to make an examination. Gums found inflammed and swollen. Diagnosis: Impeded wisdom tooth. Gum was dissected up, and an irregular mass removed with forceps. The wisdom tooth was found directly under it.

CASE 3. Reported by Dr. Steinberger—Patient, female, aged 15 years. Presented very great swelling of the face, with formation of abscess at the angle of jaw. Result same as others.

CASE 4. Reported by Mr. Harrison as occurring in pauper lunatic in an asylum in London—This, after much sloughing of the

parts, came away of itself. It was situated in the region of the bicuspids, and was different from the others in its histological character.

CASE 5. Reported by J. Tomes—An incorrect diagnosis was made, and a section of the lower jaw removed. An examination made after removal showed it to be an Odontome exactly similar to the one here shown.

CASE 6. Reported by Wedl as occurring in the practice of a distinguished surgeon—A wrong diagnosis was made, and a section of the lower jaw excised.

CASE 7. Reported by M. Forget, of Paris—Patient, male, age 20 His sufferings began many years before. All the permanent molars on the right side of the lower jaw were wanting, having never made their appearance, and their place was occupied by a large, hard tumor. The soft parts were swollen and indurated. Pus escaped from several fistulous openings. A large section of the lower jaw was removed. After examination revealed the fact that the trouble was caused by a large Odontome, under which was found the second bicuspid and one of the molars.

These are all the cases of this nature that have come under my notice. All of them have been similiar to the one I have shown, as to the structure of the malformed mass, except the one reported by Mr. Harrison, which presented a distinct pulp chamber and a more regular formation of the tissues, though, as a tooth, it was wholly misshapen.

These, it seems to me, stand out very distinctly as a class of Odontomata, tooth tumors, or Odontomes, and should not be confounded with mere excrescences upon otherwise well-formed teeth, or malformation of some particular part of a tooth otherwise well formed. What may be the causes leading to these erratic growths I do not know, but there can be no doubt that they arise from some perversion of the tooth germ. It is quite remarkable that in five out of the seven cases, they have evidently sprung from the germ of the second permanent molar, and that in all of these five cases the wisdom tooth was found directly under the mass; and, furthermore, the trouble arising from them has, in every case, been at, or a little after, the usual time that the wisdom tooth should make its appearance. We have, therefore, good reason for concluding that in these

cases the trouble experienced has been really in consequence of the impediment offered to the coming wisdom tooth by the presence of the deformed mass; while in the case I have now reported, the attachment was so slight that it was pushed out before the coming wisdom tooth.

In the case reported by M. Forget, of Paris, the conditions were somewhat different, though the report we have is not quite clear. However, it seems likely that in this case the germ of the first molar was at fault, possibly including that of the second.

In the case reported by Mr. Harrison, of London, we have more nearly the normal tooth structure, and a situation in the region of the bicuspids. This case is not quite similar to the others.

The fact that in three of these cases a section of the lower jaw has been needlessly removed through error of diagnosis, and the patients been thus horribly maimed for life, throws a dark stain over the history which should stimulate us, as dentists, to be ready to form correct conclusions should such cases be presented to us.

DISCUSSION.

DR. DEAN: These things must originate some way or other, the question is, How? The initiatory and determining tissue in the formation of a tooth is the enamel organ, which is composed of epithelium, and living epithelial cells coming in contact with connective tissue cells may have the power to initiate the formation of a tooth, or a tooth-like body. At the time that the epithelial cord or lamina connecting the germs of temporary and permanant teeth becomes severed, some cells may become detached and wander away into such proximity to connective tissue cells as to give rise to the formation of such bodies as these or of supernumerary teeth. With the help of some drawings on the blackboard, Dr. Dean made his meaning very clear to those who heard him.

DR. BROPHY: Accepting Dr. Dean's theory in regard to the origin of these bodies, we may infer that wandering epithelial cells *may* give rise to their formation in any part of the body. Dr. Byford, of Chicago, has in his possession an ovarian tumor which contains many Odontomes as well as many hairs. There is a case described in the *Chicago Medical Examiner*, in which three hundred teeth, as well as numerous hairs and nails, were found in an ovarian tumor.

DR. DEAN: According to the theory of Kohlman, there is no question but that epithelial masses, in coming in contact with connective tissue, will produce teeth, hairs, etc. Sometimes the result is a great number of minature teeth, of more or less perfect formation and very diminutive size, lying to gether so as to form a dentigerous cyst. It would seem that a tooth germ must be broken up in order to form one of these cysts.

DR. BLACK: These Odontomes seem to have sprung from the germs of teeth taking the place of the proper teeth. The dentigerous cysts are analogous to supernumerary teeth.

DR. SWAIN said he had once reported a case to the American Dental Association, in which he had removed a dentigerous cyst. A cuspid tooth had been extracted, and the tooth was preserved. Sometime afterward a prominence appeared in the place where the tooth had been, and an operation brought away a great number of miniature cuspid teeth, with some bicuspids. They were perfectly formed, with enamel, dentine and cementum, about the size of a grain of wheat, and separate from each other. Had advanced the theory that it was probably caused by the breaking up of the tooth germ; but the members of the American Association thought it impossible, though none of them advanced any other theory to account for it.—[*Trans. Ills. State Dental So.*

ON THE TREATMENT AND PREVENTION OF DENTAL CARIES DURING CHILDHOOD.

BY DR. HENRY C QUINBY, LIVERPOOL, ENGLAND.

[Read Before the New York Odontological Society December 16th, 1879.]

Having been more than twenty years in practice, I have seen many families of young people grow up to maturity, and have had probably an exceptionally good opportunity to compare the teeth of members of the same families which have come under my care, where some of the children had reached the age of puberty, and others were much younger. Of course, one will sometimes find in the same family good teeth and bad teeth; but, in the majority of cases, I have found the type of teeth in families to be similar, whether they have been of a hardy or of a perishable nature. Thus

it has often happened that I have had a family come into my hands where the eldest children would show unmistakable signs that energetic treatment would be necessary to preserve a reasonably good denture, while younger ones were suffering from the ills of first dentition, affording very fair means of comparing the results of care in time, and want of care until actual suffering made it imperative, and it would be strange indeed if this experience had not taught me some lessons which may be of practical value to the profession. To the conscientious practitioner, earnestly wishf l to do the best for the patient, the first question is not, Can I make a brilliant operation here? nor, What will other dentists think of my treatment? but, What will be the *future* of this case? Our thoughts should go beyond the present time when we are treating children's teeth, and try to realize what will be the condition of the mouth a few years hence when it is more developed. We should study prognosis as well as diagnosis, and we must not forget that it is our duty to endeavor to win the confidence of the child, and to make it understand that our object is to save it from suffering; for, if we plant in the mind of a child the seeds of fear and distrust, we are sowing the tares which, in spite of all our skill, may grow more rapidly than the corn, teaching it to conceal defects that early attention might remove, until they threaten the very life of the crop we wish to rear.

We will take a suppositious case of a child of six years of age, with the first permanent molars just through the gum. It is a well-established fact that in seventy-five or eighty per cent. of the cases that come into a dentist's hands the first permanent molars are defective, and in the case under consideration we find fissures in the enamel that in a short time would develop into serious cavities of decay. It is, perhaps, the child's first visit to a dentist, and the little patient has a vague idea of horrors to be endured that requires but little of realization to grow into a lasting dread of the dentist's chair and its surroundings. Shall we, then, fill these fissures at once with gold, and make what is generally considered a permanent protection? I have seen cases where this had been attempted, and, I am sorry to say, I have attempted it myself, but I do not think it is right. A very slight excavation of such a fissure, or, if it has reached such a stage of development, cavity of decay, and

the placing in it of a gutta-percha filling that can be made, excavation and all, in five or ten minutes, will protect the tooth perfectly for twelve months, and without much suffering to the child, or too severely taxing its patience. Could we be certain of this much from a gold filling,—the best we could make in the mouth of a nervous, frightened child? I do not think so. One child in ten might be induced to submit, but would it willingly come again to have another tooth protected from what, at the worst, is to the child only a pain that somebody says may come, while the remedy is pain that seems wilfully inflicted? Knowing that the best gold filling we can make in such cases may fail, why, then, is it not best to recognize the possibility of failure in the beginning, and make what we can call a temporary filling, and let the child go away feeling that after all the dentist is not so terrible as he had been pictured? We cannot but feel sorry for a child that has nerved itself up to bear the suffering which the gentlest operator cannot help inflicting if he makes the so-called permanent operation, only to find, as he often will, that it must be repeated again, and perhaps again. The gutta-percha filling will, of course, have to be renewed, but one peculiar advantage of this material is the perfect protection it affords the tooth, even when it is much worn, and after a few months of such protection a cavity that has been very sensitive may be excavated and refilled with very little pain. This I impute to the non-conductibility of gutta-percha. We all know how a metallic filling in a sensitive tooth subjects it to a constant succession of shocks from everything that is taken into the mouth above or below the temperature of the blood; but changes of temperature are not felt through gutta-percha. Therefore the best way to treat sensitive dentine is to excavate slightly, if we cannot do better, and make even an imperfect gutta-percha stopping, allowing it to remain a few weeks, or as long as we can trust it, when we shall find that we can excavate properly, where before the patient could scarcely bear a touch.

It may be said that such treatment keeps the patient always coming to us, and that the fear of large fees will deter many from submitting to it; but if our charges are proportionate to the time spent, few, if any, will object to a treatment that saves them pain.

Two or three years later we see indications of decay on the ap-

proximal surfaces of the child's permanent incisors. Let us cut it away if we can do so without injury to the appearance of the teeth; but, if the cavities are too deep for this, we can in most cases excavate the cavity from the posterior or palatal surface of the tooth without injury to the labial surface, and here again we may put our trust in gutta-percha for a stopping. And now let me earnestly advise all young practitioners to accustom themselves to work with the mirror. It requires practice for an operator to work from the reflected image in the mirror; but when he has acquired a degree of dexterity in this mode of operating, the work is less fatiguing to himself and to the patient, and a great deal of time is saved in adjusting the chair and appliances. I rarely have occasion to raise the seat of my chair or to change the inclination of the back, as I use the mirror for nearly all my operations on the upper teeth. And to those who will use gold for children's teeth, let me urge care in wedging or pressing the teeth apart with caoutchouc or cotton, and then using the mallet, as many a dead pulp can be traced to this mode of operating. If still later, the bicuspids—those most troublesome of all teeth to the dentist—decay, I should cut that portion away, leaving a good V-shaped space, if possible, and adhere to the gutta-percha as a stopping, if stopping is necessary.

And now we will suppose the twelfth-year molars to have erupted, and we begin to see the effect upon the teeth of the constitutional changes which precede puberty, the most critical period through which the teeth of a child of average health will have to pass. For the next three or four years the jaw will make but little growth. The mucuous membrane is showing greater depth of color, and the oral fluids are becoming viscous,—indications that the mucous secretion is changing in character and increasing in quantity. The teeth are often in that state which is commonly called being on edge, which is simply the action of an acid mucous secretion on the calcareous substance of the teeth; in fact, it is incipient decay. We have so far been fighting decay at every step of development, or perhaps we have, in another case, seen but little of approximal decay, yet the teeth stand in close contact, the canines prominent and, like veritable wedges, they are forcing room for themselves, and the family history tells us that the teeth of older brothers and sisters have not passed through this ordeal without showing traces of the

battle. If we extract the first permanent molars now, we get a much better result than if we wait a year or two longer, for the gaps caused by their removal will wholly close in nine out of every ten cases if we extract immediately after the eruption of the second molars. So, if we are to resort to this method of gaining space, we ought to decide now; and, although I know this operation is regarded by many of the best men in the profession as a wrong done the patient, I do not think so, and I unhesitatingly say that, with such indications as I have described, it is the duty of the dentist to advise and urge the removal of these teeth at this time. I know, from long experience, that it does prevent decay, and surely our best efforts should be used to prevent disease rather than to cure it. I have performed the operation in many cases, and I have never yet seen cause to regret it; while, on the other hand, in cases where I thought it unnecessary, I have had reason to regret most deeply, when it was too late, that I had not done it. Yet I would not have it supposed that I advocate this operation in all cases. I do not believe in fixed rules of practice. A man must exercise common sense and judgment in every case that comes into his hands, and if he has not these guides to steer his course by, he is not fit to practice on his own account.

It is not my purpose to discuss the causes of the defective structure of the teeth of the present generation; scientific investigation has not been my forte so much as practical and, when possible, painless work. But we know that other organs degenerate if they are not called upon to do the work for which they were intended, and as luxury has increased and food has been more and more delicately prepared, the teeth have certainly had less work to do than those of the savage, which are polished and kept in order by legitimate use, his food not having been prepared by French cooks. The savage has a full, prominent mouth, with a jaw large enough for sixteen well-developed teeth; but the prominent mouth has not been considered a point of beauty in civilized life, and thus, by natural selection, the jaw has been fined down until it is a rare thing to find one with sixteen teeth symmetrically arranged. If all the others are there, the wisdom-teeth will usually have been crowded out of position or delayed in their eruption so long that they are

defective and useless; one cusp of the tooth perhaps pierces the gum, and from that moment until it is wholly visible—a process which, as we have all seen, it sometimes takes years to accomplish —the gum is like an open sack, retaining secretions and particles of food, where no brushing or cleansing can remove them; for the gum cannot attach itself to the surface of the enamel, but only to the cementum at the neck of the tooth, and thus the whole crown of the tooth is sometimes exposed, for a period of months or years, to the action of the more or less injurious fluids or semi-fluids which are forced by the process of mastication through the opening or mouth of the sack that has been made by the eruption of the one cusp. This want of room and consequent retarded advancement of the wisdom-teeth has given them a bad name. They are the "ne'er-do-wells" of the family, and their ultimate salvation is considered hopeless; but I maintain that, in the cases where we extract the first molars and thus give the wisdom-teeth the space they require, they will be, in most cases, as good as the other teeth in structure, though sometimes rudimentary in size, which I take to be another evidence of the fining-down process I have before alluded to. Thus it will be seen that, by the extraction of the first molars at the proper time, we not only give space for the teeth that are anterior to them to separate and so save themselves from approximal decay, but we permit teeth that might otherwise be useless to make themselves serviceable masticators.

From twelve to sixteen years of age, the teeth should be watched most carefully, the gutta-percha fillings should be renewed from time to time if they become worn, and when the patient is sixteen or as soon as the condition of the oral secretions will permit,—but the age I have mentioned is quite soon enough in England, though in a warmer, dryer climate a year or two earlier may be better,—I should begin to make permanent fillings with good hope of satisfactory results. Although, as I have said before, a man cannot lay down fixed rules of practice, I have generally followed the course I have here sketched, for the last twelve years. I have rarely made a gold filling for a patient under sixteen years of age, and the more experience I have, the more I am convinced that this is the safest as well as the most comfortable treatment for young people. Sometimes my patients get into other hands, and they are sometimes

persuaded that I have neglected them; but the number of those who, having followed my instructions, are dissatisfied with the result is very small.

DISCUSSION.

DR. B. LORD. The paper read to us this evening from our friend across the water has much in it that is truly good and highly suggestive and practical.

The title itself has great interest in it, as it suggests that which should be the basis of all dental practice, but the author discusses the treatment of existing caries rather than prevention. He don't go far enough back to begin his treatment; he waits too long,—until the enemy is upon him. We ought to begin by cutting away the temporary molars from the first permanent teeth; indeed, we might go back of that and separate the temporary teeth, to prevent decay on the approximal surfaces.

The paper does not have enough to say about treatment that should precede caries, as a means of prevention. I have great faith in that treatment which looks to the prevention of the disease that we have to battle with. I believe that will be the future dentistry, and I wish I was young again so as to enjoy it. It is found in separating, or properly shaping the approximal surfaces, so that they will be, mostly, self-cleansing. And this can be done, if it is done in time and properly, so as not to make the teeth sensitive, or cause the food to wedge between them and against the gum.

As regards the treatment of incipient decay, by cutting it out or away, in order to arrest its further effects, I do not have much confidence in it, if the decay has extended through the enamel and into the dentine. It will answer for any dense tooth-structure, but often the teeth are rendered very sensitive, and if the spaces are not so shaped that the surfaces will be kept polished by use, the dentine will continue to soften.

The practice of using gutta-percha as a temporary stopping in the teeth of children and youth is unquestionably a good one for the reasons given, particularly in teeth that are soft in their structure, and hence more liable to further decay.

I cannot agree with the paper in its recommendation to extract, so generally, the first permanent molars. They are unquestionably

the most important teeth in the arch in preserving its natural size and shape, and in preserving the teeth in their natural strength and position.

Then, if these teeth are removed in quite early life in order to allow the remaining teeth to separate, we do not find this result always or even generally attained, as the teeth come together and will decay, as before, from contact, unless separations are made. How often we see so much lopping of the remaining molars and bicuspids as to occasion great loss of grinding surface; and by this shortening, undue force is brought upon the front teeth, and with very unfortunate consequences.

If, as I have said, we begin with these teeth in time, and prevent caries on the surface in contact with the temporary molars, we are all right, as decay arising from imperfections in the grinding surfaces, and sometimes on the buccal surfaces, can be stopped as readily as such cavities in any of the other teeth, as a rule. But if these teeth come to us already very much decayed, and perhaps with pulps exposed, I say, break away the corners or sides of the crowns, —not build them up,—leaving so much as can be preserved with certainty. And if it should be that we cannot keep any part of the crown, I believe we should allow the roots to remain as long as they will, in a healthy condition, to maintain the integrity of the parts and the other teeth.

The paper very properly indicates that no fixed rules will apply to all cases, but that judgment and common sense must be exercised in order that we may be of the greatest service to our patients.

Dr. C. E. FRANCIS. Dr. Quinby, in his paper, says: "There is no fixed rule to govern us in all cases." That I believe; we must exercise judgment and discretion. Many cases come to us for treatment that puzzle us exceedingly, and we are sometimes at a loss to know just what course of treatment to pursue. I have in mind a case where a young school-girl was brought to me, some few years ago, whose teeth were badly crowded and all out of proper line. It troubled me not a little to know what to do with them. After pondering the matter over in my mind, I finally concluded to advise the extraction of the four sixth-year molars, they being slightly decayed and the poorest teeth in the mouth. I believed this would

save many approximal cavities from forming, and enable the child to better care for her teeth. The four molars were removed, and a very little labor in the way of regulating made their arrangement perfect. I had the pleasure of seeing this young lady yesterday, and examined her teeth. Several minute cavities on the grinding surfaces of the twelfth-year molars and bicuspids have been filled since her teeth were regulated. As I looked into her mouth yesterday I thought I never before looked into a prettier mouth. There were twenty-eight healthy teeth, beautifully arranged. The wisdom-teeth were through, and just showing signs of decay. A fine searching-point disclosed a small pit on the grinding surface of each, which I filled. There were no signs of approximal decay. I think I never saw a more perfect denture than she possesses.

I will relate another case quite different. This afternoon a young man called on me who some years ago had his sixth-year molars all extracted. In this case I consider that the operation was a great error. There apparently was plenty of room to have retained them all, and the teeth were strong and good. They were badly spread apart. I do not know who removed the molars, but I think it was poor judgment, as in this case they should not have been extracted, for there was no necessity for it.

DR. KINGSLEY. Were the remaining molars in the first case tipped forward?

DR. FRANCIS. Not tipped one atom.

DR. KINGSLEY. The objection made to extracting the sixth-year molars because the twelfth-year molars are tipped out of place did not hold good?

DR. FRANCIS. Not at all.

DR. KINGSLEY. Does that objection hold good in the second case?

DR. FRANCIS. Yes; the teeth all seemed tipped out of place.

DR. S. G. PERRY. I have been heretofore somewhat prejudiced against Dr. Clowes because of his free use of amalgam and his habit of extracting the sixth-year molars. But I am glad to be able to do him the justice of describing a case that I recently saw in his office wherein that combined treatment had produced a most beautiful result. The case was that of a young lady of about twenty-five years of age. At about the twelfth year he had extracted the

sixth-year molars. As might be expected, the bicuspids and molars were in contact and standing upright. On every approximal surface back of the canines he had made permanent separations in anticipation of decay. The separations were made about equally on the buccal and lingual sides, and carried close down to the gum, at which place there was a firm point of contact of the smallest possible size. In no instance had the separation been carried through to the gum, and, in consequence, in no space was there the slightest irritation of that tissue, for it had not been in the least disturbed from its normal state. The separations were free enough to be self-cleansing. It was not necessary to ask the young lady if there was any discomfort, for the enamel was not cut through, and there was no sign of the lodgement of food. She stated, however, that she had perfect comfort from the teeth.

The cut surfaces were finely polished, and in every instance free from decay. As all the fissures in the molars and the fissures in the upper bicuspids were filled, it could hardly be said that this freedom from decay on the approximal surfaces was due to the good quality of the teeth. Judging by the number of these crown fillings, and the general appearance of the mouth, I cannot believe that any fair-minded, closely-observing man could escape the conviction that, had the approximal surfaces been left fully in contact, there would have been decay upon them before this time.

The cavities in the molars were mostly filled with amalgam, but the fissures were cut out to their extremities, and the fillings appeared as if they would last for life. The fissures in the bicuspids were filled with gold, and as finely filled and finished as can be done by any modern means. If any one supposes Dr. Clowes uses so much amalgam because he cannot use gold well, a glance at these fillings would convince him of his error. He assured me that this was not an exceptional case, but only one of many such that he could show.

I saw at the same time the young lady's sister, a girl about thirteen. For her he had extracted the sixth-year molars, and already the biscupids were in condition to be safe from approximal decay for years to come. Several of her incisors had decayed, but he had cut them freely away on the under side, and so filled them that no one would suppose that they were filled. The distal under side of

the right central he had "beveled," in anticipation of decay. The adjoining lateral was already handsomely filled. The work was done in such a way that, no matter how strong a prejudice one might have against such cutting, it must be admitted that the teeth were safe. And certainly they were not deformed, so completely had the work been done on the under side.

It has been my practice to endeavor to save the sixth-year molars, but I must say that in some cases, where the teeth were so badly decayed that I have been forced to extract them, and where it has been done at the right time, most happy results have followed. If done at about the twelfth to the thirteenth year, I have found that from about the fourteenth to the eighteenth year (the period of rapid decay) the bicuspids, and sometimes even the incisors, spread slightly, and the approximal surfaces are safe. Then, at about the twentieth year, the wisdom teeth come in and drive the second molars and biscuspids together, and a good denture is secured for life. As I have grown older, the conviction has been forced upon my mind that occasionally a great good can be done by the deliberate extraction of the sixth-year molars.

It seems to me that Dr. Quinby does not commence early enough. It has been my habit for some time past to ask to have the care of the children who come under my control as early as four or five years of age. Then between the molars, above and below, if there are indications of future decay, I make free separations with a disk. I also cut away the posterior surfaces of the last molars, leaving shoulders at the gum, so as to secure clear surfaces for the first molars; this being done, of course, with a view of saving the sixth-year molars. Following this plan with the temporary teeth, I must say I have found it possible to leave the teeth so that the decay is checked, and in such a manner that mastication is not interfered with, because the gum is not disturbed. It can be done in a few moments, and almost invariably without the occurrence of decay that might otherwise be looked for. The separation is a very free one, so that it is self cleansing, and is carried as near as possible to the gum and yet without cutting through the enamel, so that there is no discomfort. I will say that my experience in cutting children's teeth has led me to feel that we have yet something to do in the matter of anticipating decay in certain classes of permanent teeth.

DR. G. A. MILLS: I have taken issue sometimes with Dr. Clowes because he has asserted so strongly that he gave all kinds of teeth his method of separation. I have seen many cases where the teeth have been separated that, in my judgment, did not require it. We all know that many teeth do not indicate this predisposition to decay. Yet I do think there is a modicum of rationality in the practice, requiring the judgment and the discrimination of the operator to determine when and where to put it into practice. Certainly the paper, as read, has some good suggestions embodied in it,—not at all new, however, but worth repeating. The extraction of sixth-year molars should not be thoughtlessly done; time and circumstances should be taken into consideration to secure good results. I had a lad in my office to-day whose teeth indicated a decided lack of judgment in the extraction of these molars; they were taken out to prevent decay,—no over-crowded condition was apparent. The twelfth-year molars were in good postion, but the bicuspids were all much out of place, with an excess of space between them. Yet there was extensive decay on the approximal surfaces, two pulps exposed, and one dead, causing a swollen face. Age of patient, sixteen, and of cleanly habits. I quite agree generally with the views expressed by Dr. Lord. The practice of filling cavities in young teeth with metal comes under the same qualifications as other practices previously referred to. While many young teeth will receive metal fillings kindly, it would be very unwise to subject others to the same treatment.

DR. A. H. BROCKWAY: About the only criticism I should make upon the paper is the one Dr. Perry has indicated, that the essayist does not begin early enough. I consider the paper in the main a very sensible one. The practice indicated corresponds very nearly with what I have pursued, for the past few years at least. I confess that I shared with others in the prejudice against extracting the sixth-year molars under almost all circumstances. But observation and experience have shown satisfactorily to my mind, that cases are not rare in which the best results for the patient can only be secured by a removal of the sixth year molars. I don't recollect a case in which the sixth-year molars have been extracted at the proper time, say as early as the twelfth year, in which the tipping that has been complained of has occurred. I have in some

few cases practiced the method mentioned by Dr. Lord, of cutting off the crown of the tooth and allowing the roots to remain; but the results have not been such as to recommend the practice very strongly. I should prefer, in cases where the sixth-year molars were to be ultimately removed, to take them out before the twelfth year.

DR. W. H. DWINELLE: The sixth-year teeth being the largest of all the molars, and being appointed to the post of honor of bridging over the critical and dangerous cavity between youth and maturity, and to make normal mastication possible while the temporary teeth pass away and are succeded by the permanent ones, make the deduction clear and emphatic in my mind that it was the intention of the Creator that they should remain in the maxillæ as long as any of the teeth. Unfortunately, they are continually associated and classified with the temporary teeth, and too often are left to share their common neglect and common fate. If they were taken in time, were properly cared for and protected until the softer quality of youth were consolidated and crystallized by the years of comparative maturity, their chance of life and usefulness would be equal if not above the rest.

We all know how the removal of the sixth-year molars is apt to break up the articulation, and we know the consequences of it in contracted arches and permanent irregularities. I lately had the opportunity of examining some forty or fifty prepared adult skulls in one collection. With slight exception the denture was complete in all of them. The sixth-year teeth were as perfect as any of the other molars, and many of them had been in their place for nearly half a century, vindicating and justifying their rightful place there. Who shall say that the common good of the rest demanded their extraction "just before the eruption of the twelfth-year teeth?" Is it not the veriest nonsense to prescribe that sixth-year molars should be extracted at a certain time? Yea, verily!

DR. J. B. RICH: Some gentlemen say we don't go far enough back, and have indicated where we ought to commence. That is not far enough back if you want to produce fine teeth. The time to commence is long before the children are born. Make a good laboratory, take good care of it, and supply it with good material, then you will have fine teeth, and you will have sixth-year molars that you will be glad to see remain in the mouth.

A few words upon the subject of separating teeth. Cases present themselves where separation is the salvation of the teeth in that mouth. Again, we see mouths in which the teeth are well formed, and where there is no necessity for separation. With teeth that are narrow at the neck and largest at the crown, separation is almost necessary for such teeth always offer spaces for the lodgment of substances that will decompose and cause decay, and such teeth ought to be so cut away as to present spaces shaped like the mould board of a plow, so as to be self-cleansing. Men sometimes have theories which amount to hobbies, but with a certain amount of truth for the starting-point. Such a man is our friend Dr. Clowes. There is some truth in what he says about separating teeth and the extraction of the sixth-year molar, and it is a hobby only when it is carried to the extreme that he advocates. We should use a great deal of judgment about extracting the sixth-year molars. It is a bad theory that says "pull them out." I should prefer to keep them in the mouth, even if I had to take the crown away and leave the roots in. Delicate teeth, poorly calcified, must be kept apart.

Teeth of good, dense structure, well calcified, and that kind which our judgment and experience tells us is a desirable sort of tooth bone, do not need to be cut away. I object to the use of gutta-percha in children's teeth as a filling material, for I have never seen any gutta-percha strong enough to stand the wear of mastication. It is rare that you find parents who will bring their children back to us often enough to have the cavities kept full.

Dr. B. LORD: Do I understand Dr. Rich that he would separate teeth that are so shaped that there are spaces at the necks?

DR. RICH: Yes sir, that is what I said.

Dr. B. LORD: I should suppose they were just the teeth not to touch. The tooth-pick could be passed between them readily; there is a point of contact at the grinding surfaces and cutting edges that would prevent food from crowding between them. I should regard them as of very fine shape, and such teeth very rarely decay, and if I should separate them at all, I would enlarge that space near the gum with a file. It is teeth that have parallel sides and have broad surfaces in contact that I would separate from the grinding and cutting surfaces.

DR. J. W. CLOWES: As my name has been taken in vain, I feel

it necessary to say a few words. If there is any man here less given to hobbies than another, I claim to be that man. Of filling materials I have asserted there are five,—each equally good in its appropriate place. Had I declared any one of them, to the exclusion of the others, the only reliable substance, the hobby would have been apparent. Had I said the sixth-year molars must *always* be extracted, without the conditions of propriety and judgment, the head of the small horse would be visible. Had I affirmed that any one system of practice was perfect while all others were worthless, the neigh of the animal would have been extremely audible. Instead of this, I claim to be eclectic in my practice, and reach forth in every direction to the attainment of good, and with much pleasure bear witness to the saving excellence of extremes,—the wide and permanent separation on the one hand and the contact of golden contours on the other! My friend says we do not go back far enough. That we must tell fathers and mothers what to do. That they must eat bread from unbolted flour,—that they must mind their ways and live godly and wholesome lives, to the end that their children may have strong teeth. This is all very beautiful in theory,—but who is going to reduce it to practice? Who will follow our advice after we have given it? Will they eat and drink to compliment us? I have done much in the admonition line for many years,—I have been very earnest, and employed impressive language, but in the main my breath was wasted in fruitless endeavor. Doubtless I shall continue in this course to the end, because it is a professional duty, and my reward will be in the consciousness of having performed it. When I ask the average patient to pick his teeth, after meals, with a quill, and tell him it is the only tooth-pick deserving the name,—placing at the same time one, well shaped, in his possession, with the added remark that in its use he will find a good and true friend, the chances are ten to one he will chew it up before leaving the house; and if he should ever think to get another, it will be in the form and substance of a miniature stick of wood! The heartless indifference of those whom we would but cannot bless, is passing strange! Although our patients (with rare exceptions) will not do what is best for themselves we must not falter or give up the battle on our side. We cannot brush and pick and rinse their teeth, but we can so devise and shape conditions that the inimical forces will be disturbed and hindered in

their work. *The teeth must be so separated that in the very act of mastication they will work out their own salvation.* Our patients may not obey our behests, but there is a call for nourishment and life that must be answered. *They must wag their jaws, and by that act accomplish a change essential to safety.* The sanitary conditions of separation are greatly promoted by the *extraction of sixth-year molars.* The beneficent result of this action was seen by Dr. Perry in the younger case which I exhibited to him. In this there were only two points of dangerous contact,—between the upper central and lateral incisors,—and these were already seriously decayed. You recollect them, Dr. Perry?

DR. PERRY: Yes, sir; and they were beautifully filled.

DR. CLOWES: The remainder of this denture was naturally separate and without approximal defect,—a marvel wrought within nine months by extraction alone. By this all the teeth (though congenitally weak) were given strength,—danger was averted, disease prevented, and permanence assured. By this, in the years to come, opportunities for care may be improved,—acids from decomposition annulled, and a righteous practice, through beauty, health, content be justified.

DR. S. G. PERRY. Dr. Rich's advice to mothers is good if they would only take it. But few of them will send their children as often as they are requested to do. Dr. Rich admits that, when he says gutta-percha cannot be trusted as a filling for young persons, because they will not come back to have it renewed. We all know they will not. We must take patients as we find them, and do for them the best we can when we have them in hand. It is a hopeless task to undertake such radical reforms.

The desirability of permanent separations does not depend entirely upon the shape of the teeth. There are other considerations that are likely to be lost sight of by careless operators, namely, the age of the patient and the occlusion of the teeth. If the wisdom-teeth are not erupted and the occlusion not permanent and favorable, we run great risk in completely separating the narrow-necked teeth. I cannot believe that the narrow-necked teeth are the most favorable class for separations. I have been more successful with the short teeth with large necks, separating them so as to leave a firm point of contact close to the gum. If it can be done so as not

to disturb their relations to each other, and so as not to expose the gum, there may be a clear gain, since the abutment at the gum presents a minimum point of contact. If the V-shaped separation be avoided, and the U-shaped cut be substituted, there may be safety.

DR. J. L. WILLIAMS, Boston. I have been quite interested this evening in the subject of separating the teeth, but there is one point that I have not yet heard touched upon. The space made in separating is usually described as being larger towards the lingual side than towards the buccal; but you will notice in the natural teeth the buccal cusps of the lower molars and bicuspids strike inside of the cusps of the upper ones. This naturally tends to force the food into the space, rather than out of it, if it is shaped as usually recommended. Now, a space between the upper bicuspids or molars, to be self-cleansing in the greatest degree, should have its narrowest part towards the lingual portion of the tooth. To be sure, the bicuspids would be a little disfigured by this shaped space: but by keeping the natural outline of the first bicuspid, and slanting the line of the second bicuspid, we shall get a space through which the food will be forced outward towards the cheek during mastication and present but slight disfigurement of the teeth. Between lower bicuspids or molars the large end of the V should be on the lingual side of the teeth.—[*Dental Cosmos.*

TREATMENT OF THE "SIX-YEAR" MOLARS.

(Read before the California State Society, June, 1878.)

BY W. H. ROBINSON, D. D. S.

Could we, as an association, have 100 average children pass before us, having these teeth erupted just enough to allow a careful examination of their coronal surfaces, we would find quite a per centage of these—perhaps as high as ten per cent—that need filling. These teeth are not decayed. They are in about the same condition nature left them when her formative cells made their last deposits. There has been no disintegration of tooth tissue. The trouble is there never was proper integration of it. We meet with this same condition quite frequently in the wisdom teeth. It is ar-

rested or imperfect development. Hereditary tendencies, no doubt, have their influence. But the constitutional condition at this age has a marked influence on these teeth. The rapid development of the general osseous system, and its imperative demand for lime phosphates and constructive tissue, may deprive these of their proper allowance. Be the antecedent causes what they may, the fact is, a class of teeth meet us that need dentistry as soon as they are visible, and will soon be lost unless the dentist can remedy nature's defects.

To save these teeth for a few years is an easy matter, and as these are the main masticators, when the temporary molars are defective, this is the proper course. But when the temporary molars are sound what shall we do? Ultimately we shall have to extract most of them. Dentistry, that human ken says is practically and theoretically perfect, cannot *save*. We should bear this fact in mind and let it guide our present treatment. In some subjects, where the constitutional and hereditary tendencies favor the longevity of the teeth, and the development of the enamel on their lateral walls is in the highest state of perfection, these teeth can be permanently saved; but as a rule they are doomed to extraction, and the sooner the better.

A tooth that is *ab initio* defective, bears strong presumptive evidence that this defection is not limited to the locality where it is visible, but pervades the entire tooth structure, and the constitutional diathesis, if not the cause of this, usually favors it. Against such a combination of destructive agencies, the best skill is only temporary and futile.

Closely connected with these *ab initio* defective teeth, is another and a much larger class. The enamel is not soft or friable when erupted. The prominences of the coronal surface convolutions are high, their sulci deep, irregular and numerous, supplying just the conditions that are almost sure to develop immediate and fatal caries. While the pathological status of these two classes of teeth is widely different, they require the same practical treatment, and, alike unaided by art, soon terminate their career of usefulness in fatal caries. We find some of the frailer specimens aching in less than a year after eruption. [Just here we had to stop writing to extract one of these teeth for a little girl not eight years old. The

point at which the destructive agents had begun their work was peculiar, being the centre of the coronal surface of the frontal buccal cusp, a place we do not recollect of ever having noticed before as the initial point of decay; and the cause was no doubt *ab initio* defective enamel. Two of its companions were hopelessly gone, and we think from the same cause.]

We have said practically these two classes of teeth require the same treatment. What is that? Where the enamel of the lateral walls is in the most perfect state of development, constitution tendencies favorable, and the removal of the carious parts leaves the pulp intact and the walls firm and strong, adapt your treatment to their permanent salvation. But even in this class of teeth, if the decay is extensive and leaves the lateral walls frail, permanency is doubtful, and if it involves the approximal walls, extraction.

In condemning these to extraction we condemn all below this standard. In regard to treatment that is only intended to save these teeth for a few years, we have our doubts. If in a class that there is reasonable ground to suppose we can permanently save, all right. But in most other cases its utility is doubtful. If it necessitates devitalization or retains these teeth in a diseased condition of crown or roots, to the injury of the other teeth, it cannot be too severely denounced.

Our 100 children are now ten years old and we take another careful look at their molars, or where their molars ought to be, for by this time ten per cent. of them have been extracted, ten per cent. filled, and about ten per cent. are hopelessly decayed and should be extracted.

We find these filled and decayed teeth in various stages of preservation and destruction. In some of these the nerves were capped, in others devitalized and the frail shells filled with oxychloride, Hill's stopping, amalgam and gold. Some of these that were filled before disintegration had made much progress, and in which the parts preternaturally susceptible to decay or *ab initio* defective were small and confined to a few accessible points, are doing well and bid fair to reach a hale old age. In continuing our investigation we meet another class of these molars not *ab initio* defective, and they differ from the second class named in having no extensive centres of caries developed in them yet. The corrugations of their

grinding surfaces are prominent, their sulci deep and penetrating, and a careful exploration of the deeper pits in these molar canons reveal numerous points of incipient decay scattered over the grinding surface, the buccal sulcus and their approximal walls. As a rule we think few of this class of teeth are permanently saved.

Their treatment involves several small operations, often in localities difficult of access, or one or more complicated and extensive operations, with a consequent sacrifice of tooth structure, and in defiance of the most perfect operations, new centres of decay are apt to be developed, requiring new operations and consequent waste of tooth structure that consumes them before adult age, or at least leaves them in a very precarious condition

We take another look when our children are sixteen years old. Many six-year molars have gone to wreck with their cargoes of oxychloride, Hill's stopping, amalgam and even gold. The cause of failure in these cases has not been so much unskillful practice as erroneous theory, for we find when the proper class of teeth have been filled at the proper time failures have been rare.

We place our figures at this age about as follows:

Extracted, 15 per cent.; one-third of these had been filled. Have been filled, 25 per cent.; 15 per cent. good; 5 per cent. doubtful; 10 per cent. immediate extraction. Need filling, 10 per cent.; can be permanently saved. Need extraction, 10 per cent.; cannot be permanently saved.

This leaves forty per cent. of the average six-year molars all right at this age. We do not assert absolute accuracy for these figures. The poorer classes of society show fewer fillings, and the upper classes more, and yet we think an examination of all the children on our coast would show more than sixty per cent. of these teeth defective at this age.

This is the most important age in the treatment of these teeth. The subject has arrived at an age that enables us to study these teeth not only as to their structure and the constitutional tendencies of their possessor, but we can study them in their relations to the other teeth and the integrity of the alveolar arch. The bicuspids and second molars can now be considered in their relation to the six-year molars. We should absolutely settle the question in our own mind whether we can save them permanently, and having settled

this point, "*no*," extract immediately. I am aware that this is a difficult point to settle. Perhaps there is not a more difficult proposition in the whole range of dental practice to solve than what should be the fate of some of these teeth.

We must remember that the feelings of the subject and perhaps our own are against extraction, and on general principles a tooth should never be extracted without an intelligent reason for so doing. What classes of these teeth should we now extract assuming the integrity of their approximal neighbors?

I. All roots should be extracted.

II. All in which the periosteum is diseased, in these the pulp is usually dead or exposed, and either of these troubles justifies extraction.

III. All in which the disintegration of tooth structure is extensive and complicated.

IV. All that have involved the approximal walls of the second molar and bicuspid in the carious condition of their own, especially when crowded.

The status of the bicuspids should influence our treatment. But in general the fate of the six-year molar should be decided and executed before the second bicuspids are developed.

We all agree that there is a class of these six-year molars that cannot be saved to adult age, and their prognosis is plainly indicated.

But here is the rub. There is another class that no dentist can be certain about. Some say they can, others that they cannot be saved permanently. Who shall decide? Each one for himself. Let us suppose a case: a child ten years old is brought to Drs. A and B. Its teeth are all sound except, say, its lower six-year molars. A decides he can save the right one. B decides the left one cannot be saved. A fills. B extracts. Now it happens they were both mistaken. The extracted tooth could have been saved, and we give a verdict against B for malpractice. A's tooth failed in five or six years and was extracted. We do not blame him. Now look at the average results. Where B extracted his tooth six years ago, the space has been nearly closed by the approximation of the other teeth, and the second molar has an inclination forward that is not desirable, but both it and the bicuspid are sound

Where A's tooth has just been extracted the space is the width of the tooth and will close but little, and its antagonist is for masticatory purposes useless. Whose practice was the worse or better? We censure both, and certainly, practice that is worse in its results than sacrificing a sound tooth is deplorably *bad*.

We take a last look at our one hundred mouths when our children reach twenty years of age. The changes have not been as great as in the four years preceding sixteen years of age, but quite similar. We have to place about five per cent. of those that were pronounced perfect at our previous examination among the defective, and add ten per cent. to the number filled, and guess at how many could have been saved by proper treatment. This gives us about thirty per cent. of these teeth filled and in the mouth. Let us look at them carefully. We find all grades and conditions from the ulcerated root that shows color of auriferous deposits or metallic oxides up to the pearly crown with its golden star that has piloted it safe so far and bids fair to light it on to good old age. The class of teeth that we hold good have been those in which the constitutional bias was favorable and the decay central coronal. The average amalgam or gold plug has saved many of these. But when the approximal walls were involved and the caries extensive, involving the pulp, preservative dentistry has been a failure; yet in these very teeth we see some triumphs of skill that have saved under very adverse circumstances some very frail teeth; we might add worthless teeth, for their dissolution is certain and only a few years in the future. Here again we find these extensively filled teeth and these extensively restored devitalized remnants very difficult teeth to deal with. Parents, children and dentists have paid, suffered and labored to save them. Parents don't like to have a tooth that has cost so much extracted. Children always oppose extraction, and the operator even when he sees utter disintegration surely approaching, is loth to condemn the work of his hands and his judgment in former years. And yet these teeth cannot be permanently saved. Their retention has done harm, is doing it now, and will continue to do so till in a few years their total failure leaves this important space vacant for life. Had the dentist urged extraction when these teeth first came under his care, compliance would have been easier. And our criticism on the opera-

tor is that unless your treatment will retain these teeth with pulps intact, and with that degree of strength that promises fair to carry them safe to middle life, or at least deliver them there in the condition we find them when the person is approaching adult life, you should in all such cases extract them and the younger the age at which it is done the better. Considering these teeth alone we would make this invariable rule: Save the six-year molars with pulp intact and ample body of tooth structure to protect till the person is past adult age five or ten years, or do not undertake to save them at all. The condition of the other teeth as elsewhere stated would modify this practice.

Having looked at the molars we will now look at where the molars ought to be.

I. Where these teeth were extracted before the child was ten years old we find the second bicuspid and molar have to a greater or less degree migrated into this six-year molar space, and in a very desirable and becoming manner occupy it fully. In others this desirable condition is approximated. In April, 1877, we were called on to treat the six-year molars of a boy fifteen years old; a good subject practically and constitutionally, and teeth above average in structure, but in two of his six-year molars decay had reached the pulp. In one there was quite extensive decay involving most of the grinding surface and but slight exposure of the pulp; in the other a small deep crown cavity complicated the pulp considerably. The tooth with slight exposure and extensive decay we capped and filled permanently, and it has done well. The other we capped and filled temporarily. The result was pulpitis. The tooth was a symmetrical upper molar and all parts of the crown enamel perfect except the cavity mentioned, and we have no doubt about it being an extra favorable case to save by devitalization. We would like a vote of the Association indicative of the proper treatment in that case. Devitalization or extraction, but which?

We extracted with some misgivings as to it being the better course. While writing this essay we made a special examination of the mouth, and are satisfied we made a mistake in not extracting both teeth instead of one. Our work on the tooth filled (we being judge) was perfect. But in the other case an examination of the jaw would not reveal the fact that a tooth had been taken out, so

close and natural was the approximation of the second molar and bicuspid, and in our opinion the present status of this case is incomparably better than had we devitalized that tooth and been ever so successful.

The approximation of the subjacent teeth when the six-year molars are gone is a prime factor in their prognosis, and a point in dental practice well worthy the serious consideration of the profession.

We have got to make a new departure right here. Study carefully the age and conditions, when it is most advisable to extract the six-year molars, and what treatment their spaces and the adjoining teeth may require to obliterate this space and have the subjacent teeth moved in and occupy in the most natural and desirable manner. And until thorough investigation, accurate observation and scientific prognosis make this plain, we must grope our way in the dark. We agree to the professional verdict: "The importance of the six-year molars." But we must remember that this importance is not due to these teeth "*per se*," but to the place they occupy.

If we can make other teeth occupy this without detriment to the oral economy, the special importance of the six-year molars vanishes, and the new occupants assume all the importance once attached to them. This is why we advocate the immediate extraction of all six-year molars that do not bid fair to reach middle life, average good teeth. If the worthless ones are not extracted they occupy this important space till the osseous system is developed. *Their failure then leaves it vacant for life.* Hence we see a peculiar importance attaches to the early and proper prognosis of these teeth that *does not attach to other teeth, equally or more important*, say the upper central incisors for illustration. We are never called upon to choose between their salvation or extraction. Our duty in their treatment is to save them. Save them permanently if possible; but better save them temporarily than not at all. But this is reversed in six-year molar treatment. The worst treatment of them we can be guilty of is saving them temporarily. By temporarily saving them, we mean any treatment under which they are lost before the subject is from 25 to 30 years old; or any treatment that necessitates devitalization and extensive restoration before the person is 25 or at least 20 years old.

In operations on these teeth we are apt to trespass on their approximate neighbors. All of us have opportunities to examine mouths in which these teeth were extracted at an early age on one side, and allowed to remain in a carious condition on the other side. When extracted early the approximate sides of the molar and bicuspid are usually sound, but on the other side, where they were allowed to remain in a diseased condition, we seldom find them so. They are almost sure to involve their approximate bicuspid or molar or both of these teeth in serious if not fatal caries. Even where quite extensive efforts have been made to save them, their presence is injurious and fatal to the adjoining teeth, and indirectly so by interfering with operations on their approximate walls. They are not neutrals either in relation to the other teeth or the space they occupy. They do positive harm. Every year beyond ten they are allowed to remain in the mouth, the harm they do is greater. If we see any of their remains in mouths much over this age, we see evidence that their presence has done harm that neither nature nor art can remedy. Like the surly dog in the manger, they have occupied this important space in the mouth, and would neither eat themselves nor allow their neighbors to do so.

We will now take a look at our 100 adult mouths to note this six-year molar space. If extracted when the subject was young, and in the superior maxilla, we find the bicuspids have receded. There is probably half a line or so between them. They do not crowd the canines. This condition greatly facilitates operations on them, and is so salutary in its effects that it often arrests incipient caries. In many cases the mutual approximation of the bicuspids and second molars has brought them nearly in contact, and the nominal axis of the teeth preserved. Could we definitely prognose these cases, we would be justified in extracting even some molars that we could save. Room does much toward saving teeth. In the lower jaw we see nearly the same conditions, only a much greater tendency in the posterior molars to deviate from their normal axis, and lean forward. This deformity is seriously objectionable in many cases; and the best safeguard against it is early extraction. The angle of deviation in most cases clearly indicating the age at which the first molars were extracted; first molar roots favor this leaning of the second molars, as they allow their crowns to approach the bicus-

pid but prevent the approach of the root. Breaking away the alveolar process in extracting has the same effect. Alveolar abscess the same effect, as it favors extensive absorption of the process after extraction, and teeth do not approximate much if the intervening process is absorbed. As these teeth come under our care from time to time, and we decide they can be saved permanently, how to do it is an important matter. Having thus decided, our best possibilities should demonstrate that our prognosis was correct. These demand and should receive the most thorough treatment. What is that treatment? I hear some one say a thorough preparation of the cavity and a perfect gold filling; nothing else will do these teeth justice.

Have we all agreed to this? If so, we are just like the council of mice, who, with entire unanimity, agreed that the only proper treatment for the cat was to put a bell on her. But who could do it? Any of them, if the cat would permit. But "there is the rub." How many children will let the operator thoroughly prepare and fill these teeth? Even when young children do as well as can be expected, with their little mouths, unsteady heads and sensitive nerves, it is difficult to operate with that thoroughness and certainty that life-long operations require. Hence, because of the importance of these operations, we would only recommend gold and permanent operations in exceptionally good subjects. Oxychloride requires the absolute dryness of the dam, and is poorly adapted to the heavy mastication these teeth perform. The same is true of gutta-percha and its compounds. If gold is preferred by the parents, and their children will not submit to the conditions and time necessary for dam and mallet operations, the soft-gold cylinder and hand presure gives us a plug that has all requisite conditions of a perfect filling except hardness, and this sufficient to last to adult age. That very unprofessional and much abused compound known as amalgam, is very useful in saving these important teeth. We can make a success with this, when with any other known material we would fail. It can be properly manipulated either with or without the dam and under such adverse circumstances, that we give it our hearty recommend in many of these cases. Many good operators recommend tin foil, and we know of no serious objection to it. A word here in regard to the effect of dense compact plugs

in these teeth. We, in common with some others, hold that tooth structure is susceptible to impressions from the pressure of densely impacted fillings; that these impressions result in disintegration of tissue near the margins of the filling; that this is more liable to happen in young subjects than in those older. And although it may not happen very often, yet it does happen in young frail teeth; and soft-gold foil or tin foil, or any of the ordinary materials used in temporary filling, would not be as apt to induce this destructive tendency.

One general objection that is urged against the extraction of the six-year molars is, it mars the symmetry of the face. We regard this objection pure moonshine. We never saw a face marred by the extraction of these teeth; nor do we believe the shrewdest adept can tell by the closest external scrutiny of the face whether these teeth are in or out. Certainly only the alveolar processes of the upper maxilla, can contract; and but little absorption results from the extraction of one tooth. The same is true of the lower maxilla, only the processes change to any visible extent. And where the teeth are irregular or too much crowded, the extraction of a tooth on either side is unquestionably good practice; and unless the permanency of the six-year molar is beyond question, *it* should be the tooth, especially in young subjects, or where special causes should indicate another tooth.

DR. LANE: I notice a very great change in the opinions with regard to the extraction of six-year molars, as expressed at this session of our association, and the session of three years ago. At that time the subject was discussed, and the opinion seemed to prevail that it was wise practice to retain the six-year molars until about the time of the eruption of the twelve-year molars. I presume that increased light and experience have caused this change.

I admire the paper just read by Dr. Robinson; but I do not know what we will come to if we sanction such a general slaughter of the six-year molars, as he proposes and defends; for the third molars are generally very frail and short-lived. And then again I think that we should look at the immediate benefit of the six-year molars in mastication when the system is being built up; when the youth needs the services of these teeth. I think I should be pretty

sure that they were not going to last long, before I would sacrifice them, from the fact that their immediate service is in demand, and it will be in demand for all time to come; that is, taking everything into consideration that we may naturally expect.

Then, again, it is very hard for us to know whether these six-year molars are going to last until the patient becomes 25, 30 or 40 years of age. They may look frail and short-lived; and yet we know that the constitution sometimes undergoes such radical changes that a tooth that will not retain the filling very long, and will decay around the filling a little way, will, in time, become strong and hard, when it will resist decay, and stand a permanent filling; and we may ultimately save it for life. I claim that in such a case the patient is very much better off than if we sacrificed it. We ought to be conservative in our practice, and not slaughter these teeth recklessly, in view of the fact that the wisdom teeth are so frail and short-lived, lest we leave the patient with very poor means of mastication and a fair prospect of coming into the hands of the physician.

DR. HURLBURT (of Springfield, Mass.): In the College at Philadelphia I was taught to preserve the six-year molars, and I have faithfully followed such instruction. But I have found in my experience that many of my best efforts, with time and expense to the patient, have resulted in failures, at which I have been mortified. In consultation with those older than I am, I have found that they are very much more liable to sacrifice the six-year molars, than to preserve them, after the pulps are destroyed, and the alveolar is abscessed. You will probably be governed by the circumstances of each case. No absolute rule can be laid down by which we can decide on general principles what shall be done with certain teeth. The cases must decide themselves.

DR. HARDING: Dr. Robinson, in his paper just read, states that by the early extraction of the six-year molars the place will be more rapidly filled by the bicuspids coming earlier. There is no hope of any filling of the space by the bicuspids. You have all observed where proximal fillings have been made, that the tendency is very positively forward. The entire filling of the space must be done by the second molar.

The question should be decided very early as to whether these

teeth must be extracted; if they are to be extracted, the sooner it is done the better; then the twelve-year molar comes forward and fills the space; and you will find the advantage then in the articulation. In 90 out of 100 cases you will find early extraction a decided advantage, from the fact that afterwards any tooth on the inferior jaw may be extracted without losing the entire use of one of the superior teeth.

DR. MCCOWAN: In the treatment of six-year molars, each is a case of itself. I save all that I can, for any length of time, hoping for some improvement or reconstruction of tissue. We often have what appears to be chalky, frail teeth, which, if they can be protected for three or five years, will become much more solid, and may be saved through life. I am not in favor of extracting the six-year molars, with any hope of improving the articulation by the other teeth coming forward. They come forward unequally. A second permanent molar will come forward to a certain extent, and the wisdom tooth also; leaving an opening between, into which the food is continually impacted, which is apt to cause a great deal of irritation. It is my experience that there is a fair probability of losing the third molar or wisdom tooth, or the second molar, because of the extraction or loss of the first, on account of this continually open space, causing trouble with the gum, sometimes severe inflammation. It seems as if nothing but extraction would give permanent relief. Very frequently I am called to treat cases of this kind. In my treatment, I generally shape the opening so as to facilitate clearing, somewhat after the plan of Dr. Arthur, a V-shaped opening, leaving the proximal points of the two quite convex, so that food packed in between will not be crowded down between the teeth, and encroach on the roots. The removal of the six-year molar leaves a very considerable space, and in my experience, it is very apt to cause a loss of the use of the opposite tooth to a considerable extent. I have often noticed this pitching forward of the second molar; and the more it gets beyond the perpendicular, the more it is inclined to go in that direction, and it causes a thickness and exostosis at the roots; and finally, almost a tipping over of the tooth. I would advocate the filling of the six-year molars, where it seemed at all possible. I do not often attempt to cap an exposed pulp in such cases; but anything short of

that, I would attempt with a fair hope of success. When badly decayed it is a favorite practice with me, to excavate as well as I can, coat the cavity with gutta-percha dissolved in chloroform, and then fill the main bulk of the cavity with oxychloride of zinc. That is frequently my only treatment, for the time, with children. It will harden, and make a filling, good for from two to four years. By putting in the coating of gutta-percha, quite thin, I think the shrinking by evaporation would be so little as not to interfere with the adaptation of the filling, and it answers the purpose in my hands.

DR. LANE: You wouldn't let that gutta percha preparation extend to the crown?

DR. MCCOWAN: To cover the entire dentinal cavity, and as a usual practice, with a permanent filling, I remove sufficient oxychloride to make an anchorage for the filling; and in that case, I remove any remaining gutta-percha that may have got too close up to the crown. I would not remove the gutta-percha in a temporary filling.—[*Trans. Cal. State Dental Ass'n.*

BLEACHING TEETH.

BY W. H. ATKINSON, M. D., D. D. S., of New York.

To bleach a tooth discolored by loss of its pulp: Carefully clean it out to the end of the root, going *through* the apex into the *always present latent abscess* at the end. After drying out as well as you can, proceed to fill nicely all the length of the canal in the root and the pulp chamber with oxychloride of zinc.

As soon as it is well hardened, excavate out all the discolor d dentine that can be spared without weakening the tooth. Then fill the nerve chamber with powdered alum, and wet it with Labaraque's solution of chloride of sodium (such as the laundress uses in washing). This will bleach any tooth that is stained by vegetable color. Now dry well and fill with such shade of oxide of zinc as will restore normal color. When hard, cut out the surface and cover with gold. In case iron be the color agent, it may be removed by dissolving a few crystals of oxalic acid in the cavity; afterwards proceed as before directed.

Faithfulness in following these instructions will result in satisfaction to patient and practician, by patient perseverance.

MISCELLANY.

BRAIN GROWTH.—The question is often asked, "How long does the brain of an individual continue to grow?" Some have an idea that it attains its full growth at the age of 20 years; and we have seen assertions, professing to be from medical authority, that the brain attains its growth at about 14 years; but no close observer, no phrenologist who has had opportunity to measure thousands of heads, and to measure not a few of them say once in five years for twenty-five years, will believe a word of it.

In many cases the brain will increase in size till a man is 60 years of age, provided he have a healthy, vigorous body, and live correctly so far as diet and labor are concerned, and the mind be kept in an active but not over-excited state.

Any sharp observer may enter 50 churches in succession, when the congregations are full, and he will readily see that the gray-headed father, sitting at the head of his family, with his son 25 years of age by his side, will have a considerable larger head than his son. In numerous cases this can be remarked in looking up and down the aisles. The old gentlemen's heads are the largest. If we revisit the same church 30 years afterward, we will find the energetic son with gray hair sitting at the top of the pew, and his son at his side; and the older man will have a head bigger than the hopeful son—showing that it had been growing up to 50 years of age or beyond. We have just received a letter from Mr. L. N. Fowler, of London, which contains one remarkable passage. Mr. Fowler says: "I shall send you soon the phrenological character of Sir Josiah Mason, of Birmingham, England. In 1864 I measured his head, which was 23½ inches; in 1869, it measured 24 inches; and now, in 1879, it measures 24¾ inches plump; and he is now in his 85th year."

The law of growth, in respect to the brain, is the same as that relating to growth of body. If a muscle, or set of muscles, be called into frequent and efficient exercise, they become thereby hungry for nutrition; and when the blood is passing those parts, the nutriment carried in the blood is absorbed by the parts needing it, and they become enlarged. A broken bone needs at the point of fracture bone-making material, and the blood which carries nutrition for every part, as it

passes the region of the fracture, loses by affinity the material which the bone wants to repair the fracture. As the blood passes a flesh-wound, that part of the blood adapted to heal the wound is taken up and used where it is required. Let a person exercise the brain in the intellectual or thinking region, and the forehead will grow, while other parts remain stationary. Persons engaged in rough, laborious business need the exercise of the base of the brain, and that part of the head will grow; but if the labor require also the active exercise of the intellectual organs, the two regions will become enlarged accordingly. Those who devote themselves mainly to moral and æsthetical subjects will be found with a larger top-head; and those who have body enough to give adequate support to the whole system, including the brain, will be able to increase the size of the brain year by year by the general exercise of all the faculties until old age. The body increases in size in old age, why not the brain? Generally there is not vigor enough in the vital system to sustain the body and push the development of brain beyond the age of 50; but there are cases which we happen to know proving brain growth until after 60 years of age.

Some persons think it impossible for the brain to increase in size after the bones of the skull have become hard and strong. When the brain requires more room in any part, the bone material of the skull is gradually absorbed or dissolved, and, like lime-water, is taken up by the circulation to be reorganized into new adjustments of the skull, large enough for the brain. The clam shell is as thick as a human skull and much harder, yet a clam will double his size in two or three years, during which time the entire shell will have been reconstructed on a larger pattern in every direction. The clam is never imprisoned or cramped by his shell; he is, like the brain, simply protected and shielded as by a friend. The shell is alive, and so is the human skull, like the finger nails, or the hoofs of animals, and capable of rapid growth, though the process be to us imperceptible.—[*Phrenological Journal.*

BROMIDE OF ETHYL.—Dr. R. J. Levis has been experimenting with the new anæsthetic, bromide of ethyl. He has administered it to upwards of sixty patients, and finds it safer than chloroform, and more agreeable than ether. It is not so agreeable to the patient as is

chloroform, but being much more quickly eliminated from the lungs, has a decided advantage over that agent; then, too, it is not so depressing. The vapor arising from the ethyl is not imflammable; indeed, if a lighted match be placed in it, the flame is extinguished. This is said to be a test as to the purity of the article used. Where ether is being given, it is hardly safe to apply the actual cautery or use artificial light, hence, we can obviate these dangers by the use of ethyl. Dr. Levis recommends and uses care in the use of bromide of ethyl, as it, like all other agents of the same character, is not tolerably free from danger, demanding careful attention to the condition of the patient while under its influence. Bromide of ethyl is a colorless liquid, having a greater specific gravity than water. It was discovered in 1827, and first used by Nunnely, of Leeds, in 1849, when he used it on animals. In 1865 he used it upon patients in the Leeds General Infirmary. The quantity required to produce loss of sensibility is very small, being from two to four drachms; but this will depend largely upon the manner in which it is used. —[*Clinic and Lancet.*

THE ACTION OF MERCURY.—Dr. S. V. Clevenger, of Chicago, from an extended series of experiments on the physiological action of mercury, has been led to the conclusion that all its salts are reduced in the system to the metallic state, and that their proper constitutional effects are due to the metal itself. He has been able to discover mercury in the capillaries, and believes he has seen diapedesis of mercurial globules in the capillaries and lymphatics of a frog. A full and detailed account of his experiments and results will shortly be published.—[*Jour. Nervous and Mental Diseases.*

OBITUARY.

BROOKLYN DENTAL SOCIETY.

BROOKLYN, N. Y., Feb. 12th, 1880.

At a regular meeting of the Brooklyn Dental Society, held February 9th, 1880, the following report of special committee, expressive of the sentiments of the society in relation to the death of Dr. Samuel Stockton White, of Philadelphia, who died in Paris, December 30th, 1879, was unanimously adopted:

"When the sad intelligence flashed across the sea, from a foreign land, that death had removed from us our honored friend and brother, in the full maturity of his manhood and the height of his usefulness, our first thought was, why should such a man, so identified with the interests of our profession, so active and useful in the cause of charity and religion, be taken away at the very summit of his power?

"Dr. White was a man whom we had all learned to love and honor for his many manly virtues and his sterling integrity. In his death the dental profession has lost one who was always ready to aid any movement for the advancement of its best interests.

"Although lately he has not been identified with the profession as a practitioner, his position as a manufacturer of the many appliances needful in our practice had brought him in communication with the humblest as well as the highest in our rank, and all can testify to his clear comprehension of what was necessary for our use, his willingness to aid those struggling in adversity, and his general interest in everything pertaining to the wants of our profession.

"The dental profession throughout the world will mourn his loss. Our several Dental Societies will miss his magnetic influence, and each individual dentist will feel that he has lost a friend and brother.

"His memory will always be to his family everything that is noble and lovable, and we tender to them our heartfelt sympathy in this hour of their bereavement."

C. P. CRANDELL,
Recording Secretary Brooklyn Dental Society.

NEW YORK ODONTOLOGICAL SOCIETY.

The committee appointed in reference to the death of our es-

teemed friend, Dr. Samuel S. White, submit the following as their report:

"The intelligence of the sudden and unexpected death of our friend and co-laborer, Dr. Samuel S. White, of Philadelphia, awakens within our hearts emotions of the most profound sorrow; and, while bowing to the Divine wisdom which has taken him away from us, we are impelled to take the first opportunity of paying a grateful tribute to his memory and to give expression to our appreciation of him as a man.

"In so doing our minds naturally revert to his earlier career, and thence forward to the unfortunate hour which closed a life full of promise, usefulness, honor, and success. All will bear testimony that he was a genial and cordial gentleman, of high culture and noble impulses, full of kindly charities, and always alive to the interests of our profession. With us he was ever a welcome guest, cheering and encouraging us in our aspirations, and giving character and truth to our deliberations.

"His relations to our profession were of a peculiar character. He was one of us from the beginning. Commencing as a student and following along through a varied career to his graduation, his interests have ever run parallel with our development and growing needs. He was thus better qualified than any other man to respond to the demands of our ever advancing profession. Enterprising even to daring, he never failed to take every rational opportunity to develop and establish any prospective good to our calling.

"While recognizing the hand of Providence in thus removing from our midst, in the very fullness of his prime and usefulness, our friend, Dr. Samuel S. White, and while deploring our own loss, we do, as a Society, tender to his family and friends our heartfelt expression of sympathy and condolence.

"CHAS. E. FRANCIS.
"BENJ. LORD.
"WM. JARVIS, JR.
"W. H. DWINELLE.
"A. L. NORTHROP."

CORRESPONDENCE.

WARRINGTON, ENGLAND.

MALLEABLE AMALGAM.—On page forty-eight, of the January issue of the MISSOURI DENTAL JOURNAL, the property of malleability in an amalgam is referred to as being new. It is by no means new; the fact that cadmium and its alloys make a malleable amalgam has been well known for years. It was first discovered by Dr. Evans, of Paris, and was largely used until the fact was discovered that it not only disintegrated in the mouth in a few months, but also *stained the teeth a brilliant yellow*, doing this so effectually that the color could never again be removed. It was again introduced by Davis, in England, two or three years ago, with the same result. It does not blacken in the mouth, but a brilliant, glaring yellow and a total disappearance of the filling in a few months are not points to be recommended in any filling.

THOS. FLETCHER.

KANSAS STATE DENTAL ASSOCIATION.

The next regular meeting of the Kansas State Dental Association will be held at Emporia, Kansas, commencing on the first Tuesday in May, 1880. Reduced rates at the hotels have been procured for those in attendance, and an unusually interesting meeting is expected. The profession throughout the State is cordially invited to be present.

R. I. PEARSON, *Secretary*.

NASHVILLE, March 4, 1880.

The Dental Department of Vanderbilt University held its first commencement exercises in the chapel of the University Wednesday evening, February 25th.

The Dean, Dr. W. H. Morgan, reported fifteen matriculates, of which number the following five were entitled to the degree of Doctor of Dental Surgery:

A. T. Kline, Tenn.; D. L. B. Blakemore, Tenn.; T. E. Cabaniss, Tenn.; R. B. Lees, M. D., Tenn.; J. H. Webber, Tenn.

The address on the part of the faculty was delivered by Prof. D. R. Stubblefield, and the valedictory by D. L. B. Blakemore.

Messrs. Herman & Morrison Bros., of Tennessee Dental Depot, offered two prizes; one for the best qualified second-course student, and one for the first-course student most proficient in all branches taught in the school. A. T. Kline received the first, an S. S. White engine, and Mr. J. P. Bailey the second, a Whitney vulcanizer.

BOOK NOTICES.

OUTLINES OF THE PRACTICE OF MEDICINE, with Special Reference to the Prognosis and Treatment of Disease. With appropriate Formulæ and Illustrations. By SAMUEL FENWICK, M. D., Lecturer on the Principles and Practice of Medicine at the London Hospital, etc. Philadelphia: Lindsay & Blackiston, 1880. Price, $2.00.

In his dedication the author laments the tendency to adopt physical diagnosis as the basis for treatment to the disparagement of those indications furnished by symptoms, which are of so much importance in leading to a correct method of rational treatment.

"That close and accurate observation are essential to the formation of a good practitioner," is probably the conviction of every physician of much experience, and the longer the experience, the stronger the conviction. That symptoms are to take precedence of physical signs in the not distant future of successful medical practice, seems almost conclusive."

The book aims to give concise rules for the treatment of disease in its various forms, reference being had in the selection of the drug or other therapeutical agent to the symptoms exhibited, rather than to the specific character of the disease.

The chief object of the author appears to have been to prepare the student for passing successfully the ordeal of examination, by bringing before him in a brief space the extended teachings of the chair of practice at the London Hospital, filled by himself; and for this purpose the work is certainly an admirable one. Its conciseness will also recommend it to the busy practitioner as a book of reference.

BRAIN WORK AND OVERWORK. By Dr. H. C. WOOD. Philadelphia: Presley Blakiston. 1880. Hildreth Printing Co. and Book and News Co., St. Louis. 50 Cents.

Another of the series of American Health Primers, edited by Dr.

W. W. Keen. The work treats of the General Causes of Nervous Trouble—such as Exposure, Sexual Excesses, Alcohol, Tea and Coffee, Gluttony; of Work, its Effects, Proper Age for Labor, Difference in the Labor Power of the Sexes, Women's Work; of "Rest in Labor," "Rest in Recreation," and "Rest in Sleep."

The tendency to overwork has become so general, in this country, that American physicians and philanthropists have felt compelled to give the subject a large share of attention. The habit is about equally prevalent among professional and business men, and, often results in the premature break-down of individuals having robust constitutions and vigorous health.

The book is written in a clear and forcible style, and is admirably suited for the general reader. It deserves a wide circulation and a thoughtful perusal.

CALENDAR OF THE UNIVERSITY OF MICHIGAN FOR 1879-80.

Of the State Universities belonging to the States of the West, that of the State of Michigan takes the lead. The whole number of students for the current scholastic year is 1,427, of whom 83 are in the Dental department. This, we believe to be the largest dental class ever brought together in any of our Western colleges, and is of itself sufficient evidence of the prosperous condition of that department.

ORAL DEFORMITIES. BY NORMAN W. KINGSLEY, M. D. S., D. D. S.

This valuable work has just been received, too late for review in the present number. We shall speak of it more fully in the next.

DENTAL ALMANAC FOR 1880. BY ADOLF PETERMANN. "Mit 2 Portraits in Stahlstich."

A very useful work.

RESEARCHES ON HEARING, Through the Medium of the Teeth and Cranial Bones. BY CHARLES HERMON THOMAS, M. D.

Read before the Philadelphia County Medical Society, Dec. 17 1879.

COLOR BLINDNESS AND DEFECTIVE SIGHT AMONG RAILROAD EMPLOYES. BY DR. B. JOY JEFFRIES.

HOW TO KEEP TEETH CLEAN AND HEALTHFUL. BY DR. GEORGE A. MILLS. Brooklyn, N. Y.

Read before the 1st District Dental Society of New York, October, 1879.

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NEURALGIA AND ITS TREATMENT.

BY TRUMAN W. BROPHY, D.D.S., CHICAGO.

[Read before the Wisconsin State Dental Society, at Milwaukee, July 16, 1879.]

The term neuralgia, which stands as the title of the paper I now have the honor of presenting to you, is derived from the Greek roots, "Neura," a nerve, and Algios, pain; hence, we have, when translated, nerve-pain, or pain in a nerve. "Under the head of Neuralgia," says Prof. Flint, "are embraced a group of local affections characterized by pain occurring without inflammation, or any appreciable change in the parts affected. All that can be said of the pathological character of these affections is, they consist in a perversion of sensibility." Accepting this as the correct definition of *true* neuralgia, we have to consider another species of nerve-pain, induced by local irritation, the result of which is an engorged condition of the capilliaries, and their pressure against the nerve-sheath produces pain. It is this species of neuralgia, which the dental practitioner is most frequently called upon to treat.

As the result of investigation by Radcliff, an English scientist, a nerve was found to be analogous to the pole of an electric battery. The nerve-sheath acting as the negative pole, while the nerve proper acts as the positive. It is by this means he accounts for the transmission of sensation, from the periphery of a nerve, to its ganglion, thence to the seat of sensation. Although neuralgia is the cause of suffering of the greatest severity, it is not, strictly speaking, a disease, neither do the most intense and long continued attacks terminate fatally. Patients are, in many instances, subject to neuralgic pains during the greater portion of their lives, and finally die of diseases which were not induced by, nor in any way connected with neuralgia. According to an analysis by Valleix, a French physician, as to the manner in which neuralgia terminates, he found, that in seven-ninths of the cases examined a permanent cure took place. In one-ninth there was improvement without recovery, and in the same proportion there was neither cure nor improvement.

There has been considerable speculation among investigators, as to the cause of neuralgia, when it cannot be ascribed to any apparent lesion; foremost among whom is Dr. Francis Edmond Austie, who claims that true neuralgia *is* a disease. In the third chapter of his monograph on this subject (p. 110) he says, "I expect to convince most readers, that the essential seat of every true neuralgia is *the posterior root of the spinal nerve, in which the pain is felt*, and that the essential condition of the tissue of that nerve-root is *atrophy*, which is usually non-inflammatory in origin." The comments of the best authority, however, admit that such a condition is met with, but regard it as an explanation of peripheral pain. I fail to find any one willing to support Dr. Austie's theory of atrophy of the posterior root of the spinal nerve.

It is not my intention to comment on the causes of *true* neuralgia to any extent, but believing that lesions within the oral cavity are the predominating causes of neuralgia, and that it should receive more attention and be thoroughly understood by us, as in my opinion the oral or dental surgeon is, owing to the very nature and location of the disorder, the proper one to treat it. I shall attempt, therefore, to point out some of the causes of

TRIGEMINAL NEURALGIA,

and its treatment. In doing so I shall advance no new theories, for I have none, but shall relate a few cases which I believe to be of deep interest to us as a profession, and which have not heretofore come to your notice.

There are few persons affected with neuralgia, as the term is generally understood, that seek the services of the practitioner of dentistry to obtain relief. When a patient thus affected presents himself to us, he usually denominates his trouble "toothache," and believes that the removal of a certain tooth, or teeth, will effect a permanent cure; when in fact, the teeth in some instances are in no way implicated, the pain emanating from other causes. It is in the treatment of such cases that the best of judgment is demanded, and the ability of the practitioner put to the test, to diagnosticate, with the accuracy to be expected from one professing to possess the requisite knowledge of pathology and therapeutics, to treat with reasonable success these affections, the causes of which are sometimes very obscure, and which are frequently, erroneously attributed to the teeth. All members of our profession have no doubt seen persons whose teeth have been removed by advice of their physician, with a view of being relieved from general neuralgia. The teeth of these persons were pretty good, none indeed being sufficiently carious to produce odontalgia. We have observed, that in some such cases the result desired was not obtained, the pain not being abated even in the slightest degree. On the contrary, the removal of the teeth has been to the patient a serious and irretrievable loss, all of which must be regarded as the result of failure, or inability, to correctly diagnosticate the condition.

On the other hand we have seen persons, who have been under treatment for neuralgia for months, and in some instances years, taking medicine almost daily, and yet obtain only temporary relief, if any; when upon close examination of the teeth, removing all the fangs which are not sufficiently firm to be crowned, and properly treating and filling such teeth as can be preserved, the neuralgia quietly, and in many cases effectually passes away. The exciting causes of *true* neuralgia are usually a damp, cold atmosphere, miasmatic influences, or an anæmic condition of the system; to this we might add syphilis. As before stated, the species which we, as a

profession, are most frequently called upon to treat, emanates from some lesion, or the presence of some substance which impinges upon the nerve-sheath, thus causing pain.

Of these causes, by far the most common is nervous odontalgia. However, it may proceed from periostitis, exostosis, the contracted arch and crowded teeth, partial calcification of the pulp, pulp-nodules, or fractures of the maxillary bones, causing spiculæ of bone to come in contact with, and irritate the nerve. This latter condition may, and doubtless does result in some cases, from the unskilful use of the forceps. Neuralgia may be induced by a cicatrix, which contracts the soft tissues adjacent to the nerve, thus producing pressure and consequently pain.

Indeed, it may be caused by anything which interferes with the organic functions of life. What, then, shall the first step be to alleviate our suffering patients, from this dreaded and terrible affection? Answer: search for, appreciate and remove the cause; and since trigeminal neuralgia originates most frequently from carious teeth, our attention should always be directed to a thorough diagnosis of the mouth. If the teeth present an appearance of soundness, be not satified with this, as there are many cases where caries are proximately situated, and so obscure that time is required to secure sufficient space to accurately diagnose. Some will doubtless say, why do you speak of odontalgia or exposed pulps as the origin of neuralgia? Why do you confound the terms? or how is odontalgia distinguished from neuralgia? In answer, I will say, the sensations produced by neuralgia are the same and identical with nervous odontalgia.

We have all been consulted with reference to pain, described by our patients as being of the neuralgic type, periodical and lancinating. The patient is unable to locate it, but imagines it may possibly proceed from the teeth. A close examination reveals, along the surface of a tooth adjacent to its neighbor, and in the majority of cases just about the free margin of the gum (which is absorbed) and underneath the enamel, carious dentos; this may or may not be broken down. The demineralized tooth-substance at this point may be in its perfect original shape, but by probing it is found to be a soft, gelatinous mass, which easily allows infiltration of the secretions of the mouth, hence the source of pain. Such cases are

most frequently observable in patients of middle or advanced age. In case fractures of the bone have occurred, a free incision should be made and the disconnected bone removed. Some of the most aggravating cases of neuralgia are due to fractures of the bones, necrosis following, with a deposition of new or secondary bone, which so involves the sequestrum that the efforts of nature cannot expel it.

The skill of the surgeon, therefore, must come to the rescue. The effect of the so called pulp-nodules and partial calcification of the pulp upon the nerves supplying the teeth is familiar to all. We realize the necessity of relieving the suffering, and yet, our task is one surrounded with difficulty of the most complicated nature, more especially so when the patient is unable to locate the seat or origin of the pain. To diagnose correctly the cause of neuralgia, when due to pulp-nodules, when no particular location of the pain can be designated by the patient, is a task worthy of the most profound observer, and the most thorough and accurate diagnostician. Fortunately, however, cases where the pain cannot be located are rare. The teeth containing these excresences or nodules within the pulp-canal, are usually sensitive to the tap of an instrument. The pain is increased by quick changes of temperature, or upon hard pressure. The irritation of the tooth-pulp and the dental periosteum, occasioned by these nodules, is followed by an elongation of the the tooth, sometimes slight, but very distinct. This is probably the most marked symptom of the disturbance in question. These nodules doubtless are produced by the odontoblastic membrane which has been subjected to gradual, persistent, prolonged, though slightly irritating influences.

The treatment for this source of nerve-pain is, of course, to remove the cause, and that can be accomplished by drilling to the pulp-canal and carefully removing the little, pebble-like, ossific bodies, with a very fine-pointed excavator. If, however, the pain experienced in their removal is very severe—as it generally is—the arsenious paste may be applied, after first reducing the congestion of the blood-vessels, then the nodules can be painlessly removed and the roots treated according to the approved modes of the day.

Exostosis of the fangs of the teeth, a fruitful source of neuralgia

is, indeed, as difficult to diagnosticate as pulp-nodules, unless the fangs affected are enlarged to that extent which clearly locates and defines the affection. In exostosis, as in pulp-nodules, it is gratifying to say that the pain is more localized than diffused.

The sensation produced by dental exostosis is that of fullness, and it is when the alveolus does not yield by absorption, in proportion to the growth of the tumor, that neuralgia is produced, sometimes of the most painful type, and if not understood, it may be treated an indefinite time without any beneficial effects.

My experience and observations teach me that exostosis results, in a very large majority of cases, from irritation of long standing, and final death of the pulp. Sometimes, it occurs upon the fangs of perfectly sound teeth, but, far more numerous are the cases where a portion, or the whole of the crown of the tooth, has been destroyed by caries. A sound tooth, affected with exostosis, not always, but usually, has characteristics differing in a marked degree from its fellows, and it is through this medium the offending member is pointed out. I allude to the consolidation, in the whole tooth-structure, of calcium salts which renders the resisting force of the organs, to the instruments, greater than is ordinary, and far in excess of the adjacent teeth. This condition can usually be recognized by the experienced eye.

The treatment for neuralgia resulting from exostosis is, to remove the affected tooth. Some of our professional brothers, with pride in preserving such teeth, might extract it, remove the tumor and replace the tooth. The fears of tetanus, however, and a vivid recollection of the loss of a patient of this disease, by a professional friend, who had replaced teeth, after removing the exostosis, would debar your essayist from such a practice.

Mr. Salter, in his admirable work on "Dental Pathology and Surgery," describes a case of intense neuralgia of the eye-ball and face, which caused a change in the color of the iris, resulting from carious teeth.

This case was indeed a remarkable one. It is so important to us, and illustrates how men of the highest medical skill sometimes fail in making a correct diagnosis of lesions, or affections, which have their origin in the teeth, that I shall quote it. He says, "Mrs. C., aged about thirty years, was sent to me by Dr. Oldam on the

21st of June, 1867. She was suffering from neuralgia of extraordinary severity, affecting the left eye-ball, and the left side of the head and face. She had suffered almost continuously for ten years, the attack commencing on her recovery from a bad confinement; and no medicines had given her distinct relief. The most singular and interesting part of the case is, that the iris of the affected eye has completely changed color under the influence of the continued pain. Both her eyes were originally of a deep and bright hazel color; the iris of the right eye remains as it was, but the left has changed to a dull gray, without any trace of the original hue. This change has occurred progressively till the eyes are now as if belonging to two people of totally different complexion. No artificial painting could exhibit a more strange and striking contrast. When this lady came to me she was in a pitiable condition, suffering such agony as I have seldom witnessed, and worn out and exhausted by the continual sleeplessness which the pain had occasioned. Upon examining her mouth, I found that the left lower dens-sapientia and the first upper bicuspid were badly carious. I removed these teeth, and the operation was attended by a terrible paroxysm of neuralgia, but upon recovery from this, the patient expressed her conviction that the extraction of the teeth had cured her, and so it proved. From that day till the eighth of October, three months, she was entirely free from pain; she had scarcely known such immunity, even for three days, since her neuralgic sufferings commenced, ten years before. As she expressed it, 'it was like a new life to her.'" The only comment I wish to make upon Mr. Salter's treatment of this case is, I believe he would have done the lady a better service had he treated, and, if possible, preserved these teeth.

He continued: "On the eighth of October the old pain came back again, and my patient came to me on the tenth, just in the condition she had been at first. I now found that the second upper bicuspid was carious, and intensely tender. Upon its removal a considerable exostosis was seen on the root. The pain vanished with the tooth, and the patient wrote to me, a week after, saying she was quite well. The iris of the left eye, however, has never gone back to its original color, but remains a leaden gray. The eye does

not appear to have undergone any other nutritional change: its vision has not been affected.

A case of neuralgia, of great importance to the dental surgeon, was recently described to me by Dr. Deering, of Chicago. A lady about forty-eight years of age, strong and healthy, residing in Kansas City, called on a dentist of that place to be relieved from severe neuralgic pain, described by her as analogous to toothache; she had lost all her superior teeth about twenty-five years earlier, and had since worn artificial teeth. The pain was located on the left side of the arch, in the region of the antrum. The dentist examined her mouth carefully, and concluded that the plate she was wearing was the sole cause of her suffering.

The lady at once had a new plate constructed by him, but her suffering was not in the least abated. The dentist thereupon called a surgeon, who also examined her mouth, and pronounced her condition the result of a tumor upon the palatine plate of the left superior maxillary bone, and advised an operation. She consented. The mucous membrane was divided, a chisel and mallet were brought into requisition, and an effort made to remove the tumor. Having no success, however, he desisted, feeling he was not equal to the case.

The following day the face was greatly swollen. The surgeon assured her that her's was an unusual case, and advised her to go at once to Philadelphia, and employ a distinguished surgeon of that city, who would effectually cure her. Following his advice, she went to Philadelphia, via Chicago.

Stopping here a few days with friends, she was requested to call on a dentist for his opinion.

He examined the case and informed her that she was on the right track. It was a very serious matter and required the highest skill to treat it. On arriving in Philadelphia, she consulted the eminent surgeon, and he pronounced the trouble ulceration of the mucous membrane of the antrum. With a drill he made an opening into the antrum, and through the opening applied the usual remedies for this disease. This was continued for some time with constitutional treatment, consisting of quinine, iron, and other remedies which were indicated.

This treatment was continued eighteen months, with very little, if any relief. She left Philadelphia to return home, with directions to continue the quinine two months longer, and report by mail.

She stopped in Chicago, on her return home, and called on Dr. Deering, who was the first to correctly diagnosticate her case. The pain was still very severe, and located in the region of the antrum. A protuberance was observed midway between the alveolar ridge and the palatine-suture of the maxillary bones. An exploring instrument was passed through to the enlargement, and an idea formed by the doctor of the nature of the trouble.

He then questioned her in regard to her dental history. She informed him that her teeth were all extracted when she was about twenty-five years of age.

The question was then asked, "Are you sure they were *all* removed?" It then occurred to her for the first time that on each side of her mouth the second deciduous molar remained at that time, the dentist having called her attention to the fact, and remarked that possibly she would sometime get the second bicuspid teeth. An operation was performed, a bicuspid tooth was found imbedded lengthwise in the maxillary bone, with apex well into the antrum. This was with some difficulty removed. The crown was chipped off a little by the Kansas City surgeon, who failed to remove it, otherwise the tooth was in a perfect condition. After the effects of this operation had passed away, the patient, for the first time in four years, had perfect immunity from pain. Three months subsequently, however, pain of the same character was felt on the opposite side, and another operation was performed with the same result. Dr. Deering kindly brought this lady to my office, and upon examining the mouth, two slight grooves were seen on either side where the teeth were removed. No neuralgic pain has been felt since. The opening made into the antrum, however, has not closed. The inflammation brought on by the use of the strong medicinal applications is, indeed, difficult to reduce. No evidence of the operation, other than that spoken of, exists. Thus a patient suffered pain of the greatest severity during so long a period, all owing to failure on the part of the professional gentlemen she had employed to accurately diagnosticate her case.

The lesson to be learned from this case is, think of more than

one thing when making up a diagnosis. This was a case belonging strictly to dental surgery, and had the dentist possessed sufficient knowledge to accurately diagnose the case, the difficulty could have at once been corrected. As before stated the cause of true neuralgia, is a question upon which the most eminent pathologists cannot agree.

It is sufficient for our purposes, however, without discussing the different theories advanced, to state that it is generally conceded, that true neuralgia results from some organic disturbance, as inactivity of the liver, and consequently constipation of the bowels; especially is neuralgia due to habitual constipation. In the plethoric patient, neuralgia may usually be attributed to the presence of uric acid in the blood, but this class of patients is not often subject to neuralgic affections. By far the most common cause of true neuralgia is anæmia; a pallid, pinched-up face; a dull, sunken eye, accompanied by poor appetite: such a person is exceedingly liable to neuralgic attacks.

Romberg, when speaking of anæmic conditions and neuralgia resulting therefrom, says, "It seems as if pain were the prayer of the nerve, for healthy blood." In the treatment of neuralgia resulting from this cause, the protracted use of tonics must be employed. If, however, the attacks of pain are very severe, they may be relieved by the use of narcotics. But permanent relief cannot be looked for until the system is built up. If the patient suffering from neuralgia resides in a malarious district, quinine is indicated. Lead poisoning is another cause of neuralgia, which I have no doubt has been caused in many instances by the unscrupulous dentist, who has repaired, or had repaired by a tinner, silver and other metallic plates, with soft solder, lead being the chief constituent.

An interesting case of trigeminal neuralgia came into my charge two years since. A gentleman, aged thirty-eight, consulted me with reference to pain located by him in the left second superior molar. A careful examination revealed no caries, no accumulation of tartar, no periostitis, but slight congestion of the gums; also slight inflammation of the face at the terminal branches of the infra-orbital nerve.

My patient requested me to extract the tooth described. I informed him of its soundness, and refused to comply with his request,

also informing him that his trouble was neuralgia. I applied Tr. Aconite to his gums, and prescribed as follows:

℞

Prusiate of Potass., - - - -	3i.
Eau de Cologne, - - - -	aa ℥i.
Tr. Aconite (Flemming's), - - -	

M. Sig.

Dilute, if too strong, with water, apply with sponge every two or three hours. I directed him to keep warm flannel constantly applied to the affected side, and report the following day, when I found his condition much improved, the paroxysms of pain occurring at greater intervals and less severe. I prescribed Sulphate of quinine grs. xxiv. in four doses, a dose every three hours, and to continue the local application.

These directions were carefully followed, and two days after he pronounced himself well. Five days after this, however, another paroxysm of pain returned, when he declared that I must extract the tooth, but I dissuaded him, and put him again on the same treatment, with the same result. I saw my patient on Friday, three days after the last administration of quinine, when the information of his recovery was with great pleasure received.

The cause of the neuralgia in this case was by no means clear to me, since the patient was unusually robust and strong, not being subject to any ills. During the subsequent week, however, light was thrown upon the case. My patient informed me that on the Sunday following his last conversation with me, a physician removed from him a tape-worm forty-eight feet in length. Then the cause of the disturbance of the nervous system, and consequently the neuralgic pain, was at once understood. The disturbance or agitation of the system in this case must have been very great.

The day subsequent to the operation, the local applications to the face were frequently resorted to, to control the occasional paroxysms of pain.

I saw this patient, during the past month, when I learned that no trace of neuralgia had since recurred. Another case of neuralgia, of great severity, came to me during the past week. A gentleman of sedentary habits, aged about fifty years. The pain in his case was in the terminal branches of the infra-orbital nerve, also in the

supra-orbital. Finding no carious teeth, which would be liable to cause the disturbance, I questioned him in regard to his general health, occupation, &c. I found that he was subject to constipation of the bowels to such an extent that it was necessary to take medicine every morning.

The pain was steady in this case; it came on at about ten A. M. and would subside at about six P. M. He had suffered only a week, but he said it seemed like a month. The eye on the affected side (the right side) was greatly inflamed, and the tears were constantly flowing. The mucus, from the right nostril also flowed profusely. This I believed to be a case of *true* neuralgia, and I gave him the following:

℞

Quinia Sulph. - - - -	grs. xxiv.
Acidum Sulphuricum (dil.) - - -	ʒ j
Elixir Taraxacum, a. d. q. s. - -	ʒ ij

Sig.

To be taken in four doses; one dose every three hours. He called two days subsequently and reported a perfect immunity from pain. I have not seen him since, and therefore believe it has not returned. A rule which I have adopted, is as follows: When a patient presents himself, whether suffering pain or not, to first carefully remove the salivary calculi and cleanse the teeth; then medicate those which require it, if any, then extract every fang in the mouth deprived of its crown, excepting, of course, those which may be restored to usefulness by mounting them with crowns. This done, I am prepared at the next sitting to make a more intelligent diagnosis for neuralgia or other affections.

We should firmly object to allowing our patients to dictate what we shall do. If they wish our services, and have confidence in us, we should insist on doing what we know to be for their interest.

In writing on this subject, gentlemen, I may have wandered to some extent, and transcended the prescribed bounds of dentistry, according to the views of some; but if I have done so, it is my weakness, and I am not responsible for it. The all-absorbing question again persists in thrusting itself before us: Are we to treat surgically or therapeutically diseases of the teeth, and those diseases which emanate from the teeth? Are we to content

ourselves with filling carious teeth, oblivious of the chemical action which brings about their disintegration, a recurrence of which *will* follow the most perfect manipulations, without even an effort on our part to correct it?

Shall our knowledge of surgery be confined to extracting teeth? Shall our occupation be that of plate-makers? Is our knowledge of pathology to be confined to congestion and inflammation of the dental pulp and gums? Shall we say our profession is conversant with the branches of medical science, materia medica and therapeutics; when creasote and arsenious paste are the sole stock of remedies in the hands of hundreds of men practicing dentistry in this country, and making local applications to inflammation or suppuration of the mucous membrane, when in many such cases no man can cure them without constitutional treatment? And even in this advanced and enlightened age, to see our professional brothers, presumably in the full possession of their reason, surrounded by books of reference of the highest order, and periodicals filled with the richest fruit of experience, observation and knowledge; practicing their profession after the ideas of the generations of the past? Or shall we not put forth a greater effort in acquiring knowledge of surgery, pathology and therapeutics, as far as they can, in any *way*, *shape* or *form*, be associated with, or applicable to, our specialty? My answer is, Yes. What the better men in the dental profession stand most in need of to-day is a greater, more extensive knowledge of the action of remedies, and how to administer or apply them.

I care not to be a general practitioner of medicine; my profession is a better one for a young man. The views of many are opposite to mine; but as for me, I do not care to suffer the humiliation of turning over to the general practitioner of medicine cases which are strictly within the province of dentistry, on the ground of not understanding them.

The great work to be accomplished by our profession is to prevent, if possible, caries of the teeth. If, however, we fail in this, our next duty is to arrest it. This, in my opinion, can only be accomplished by the aid of a knowledge of chemistry and therapeutics, a complete control of the patient, thus enabling the practitioner to prevent or correct a contracted arch and crowded teeth, a strict observance of the laws of hygiene, and last, but not least, the careful,

trained and skilful hand of an honest, conscientious dentist. So far as we succeed in preventing and arresting caries of the teeth, just so far we shall be instrumental in doing the greatest service within our power to humanity, and nipping in the bud the condition which in some instances grows to such gigantic proportions, in the form of trigeminal neuralgia.

REPORT OF COMMITTEE ON DENTAL CHEMISTRY.

BY J. L. ASAY, M. D.

[Read Before the California Dental Association.]

Chemistry, in its entirety, is a science in which no deviation from principles is possible; the laws which govern it are positive. We may divide it into medical, dental or any other branch as we choose, but no line of demarcation exists to distinguish one from the other, since its laws are universal and fixed.

It is therefore assumed that dental chemistry, so far as its name implies, is merely an imaginary division for special study, and relates to chemical changes occurring in the oral cavity, and the effect of inorganic substances when brought into contact with organic substances, together with the chemical nature of materials employed in dental science.

As a dissertation upon the whole branch of dental chemistry would consume much time, would be equally laborious, and lead us through interminable labyrinths, we are obliged to content ourselves, on this occasion, with certain subjects, as a precursor to its more intimate relations which may from time to time appear, ever trusting that as the discoveries of to-day are but the finger-posts that point to the triumph of the morrow, so may we be induced to patiently study the complex and varied changes occurring in the mouth, that we may practice our profession intelligently and successfully.

The first of these subjects, therefore, which attracts our attention is the

REACTION OF ORAL FLUIDS.

It will be remembered that three distinct pairs of glands empty

their secretions into the mouth, besides numerous follicular glands lodged in and beneath the buccal mucous membrane.

From experiments of Magendie, Bernard and others, it is demonstrated that the fluids of the parotid and sublingual glands are clear and watery, and contain but a small proportion of solid matter, whilst that of the submaxillary is thick and viscid, and contains a larger proportion of solid matter.

With the influence of the respective salivary glands on digestion, and the important part they play upon food when taken into the mouth, to be afterward submitted to the functions of the stomach, we have no present interest, but certain it is that they act in different degrees of efficacy for that purpose.

The secretions from these sources are often varied in quantity, under certain influences, being augmented by the action of the masticatory muscles, the odor of savory food after a long fast, and other exciting causes; diminished by fear and exalted temperature of the body.

What are considered the normal characteristics of saliva, is a question, to many minds, of perplexity, yet it has, in a measure, been conceded to depend upon the nationality, habits and pursuits of the individual, and that saliva is normal, in which acidity and alkalinity in the mouth are so neutralized by contact with each other in such proportions as to leave alkalinity in excess.

A sweeping assertion has been made, and often reiterated, that the characteristic reaction of saliva is alkaline; to this we agree so far as an admixture of the fluids is concerned, yet it is far from truth as regards the identity of each distinct secretion; besides, many modifications may and frequently do occur; for instance, saliva changes its chemical proportions after a full meal when it is alkaline to the end of a long fast, when having passed from the alkaline condition to neutrality becomes decidedly acid in its reaction, and how shall we determine that the one condition for the time being is not equally as normal as the other.

Again, we find from observation that in subjects of robust health and hearty eaters of wholesome food the mixed fluids of the mouth are always alkaline, but in those of effeminate stature, with nervous temperaments and sedentary habits, they are either neutral or acid.

We therefore assume that an alkaline reaction is not universal in

health, even when the litmus is placed directly under the tongue, which is the most favorable position for the test. But may not the secretions be acid in one part of the mouth and alkaline in the other? Experiments have shown that where the test has been applied under the tongue in an admixture of saliva, showing an alkaline result, yet by applying the litmus to the free margin of the gums, or in a deep sulcus of the mouth, previously rendered perfectly devoid of food or other extraneous matter, we secure a decided acid reaction.

So far as our observations have been made, we are led to believe that this acid condition is produced by the agency of the buccal mucus, containing a peculiar principle called ptyalin, albuminous in character, and in such conditions as to be capable of producing fermentation. Neither pair of salivary glands, according to the researches of Cl. Bernard, can by themselves effect the change, "but an admixture is necessary for the generation of the peculiar ferment."

Saliva is liable to a departure from its normal standard through such a cause, as in fever, or other acute affections of the system where the degree of temperature of all the organs is raised, thus affording increased facilities by the influence of heat and moisture for the process of fermentation; and it is in such cases that an alkaline wash for the mouth is particularly grateful to the patient and serves as a preventive to those morbic changes which attack the teeth and appendages during such a condition of exaltation.

Acids are generated in the oral cavity from food and condiments taken into it. More especially is this the case in uncleanly mouths. In such instances as where portions of the food are allowed to be retained about the teeth and in their interstices, we have by the simple process of fermentation the generation of acetic acid, and as decomposition advances it will frequently be observed that upon removing extraneous matter from beneath the teeth or other receptacle the familiar odor of sulphuretted hydrogen is present, and such conditions will remain so long as the exciting cause is permitted to exist.

Other acids found in the mouth are lactic, citric, malic, and frequently the mineral acids. The presence of these vegetable acids is attributed to their being set free during the mastication of the fruits containing them. Lactic acid exists in the mouth of those

afflicted with gout, rheumatism, malarial affections and gastric complications. Mineral acids, though no doubt frequently generated in the mouth, yet chiefly owe their presence to their administration as medicines, and when we remember that the nitro-muriatic is a tonic of par excellence in many cases, and is habitually used as such, and that hydrochloric, in the form of tinct. chloride of iron, is the sheet-anchor in diphtheretic affections, we need not be surprised at the ravages of tooth-structure as the result of these acids.

But as I have before stated, they may be generated in the mouth. For instance, nitric acid may be formed from the nitrogenous food remaining in the mouth and concealed in recesses, the food giving up its nitrogen which, uniting with hydrogen in the necessary equivalents to form ammonia, which in its turn, becoming decomposed and an oxide of nitrogen formed, of course nitric acid will be the result.

In organic structures, sulphur is always united with albumen, and the same causes that produce sulphuretted hydrogen in the mouth will assist in forming sulphuric acid.

Hydrochloric acid is contained in the gastric fluids, but the quantity that would be found in the mouth from this source, as by eructation, is so trifling that its consideration will not at present be attempted; besides the salivary glands, either by their secretory or excretory functions frequently furnish it, but its presence is oftener due to the union of hydrogen with chlorine, the latter being liberated from the chlorides dissolved in the mouth or from the continued use of saline diet. Again, its presence may be due in consequence of Galvanic action caused by the insertion of different metals in teeth of the same mouth. More particularly should such fillings be of gold and of amalgam. Mucus and saliva contain the chlorides of sodium and potassium, and these being resolved into their elementary principles by Galvanic action thus established, the chlorine unites with the hydrogen, and hydrochloric acid is the consequence.

In regard to formation of acids by fermentation and habits of negligence, the old adage that "cleanliness is next to godliness," is in such cases particularly applicable, and should be deeply impressed upon the minds of those entrusting themselves to our care. The mouth needs washing as much as the face and other parts of

the body. Teeth of good structure, if kept clean, seldom have their continuity impaired; otherwise we always have disintegration of tooth-structure, the deprivation of its early constituents, and eventually its irreparable loss.

All acids found in the mouth when predominating, although in their weakest condition, will dissolve the lime-salts, and this degree of decalcification is in proportion to the density of structure attacked, and is exhibited in the greatest measure where chalkiness of the teeth is in excess, from such causes as inheritance or impoverished condition of vital forces.

Acids to disintegrate tooth-structure must be constant in their application. When acid first attacks a base, a salt is formed, which is no longer acid or alkaline, but neutral in its character, and this salt must be removed, as it necessarily is by being taken up and held in solution by the fluids of the mouth, and a new quantity of acid brought into contact with the exposed structure to continue the process of decalcification. In other words, there must be a continuous circulation of fresh acid, otherwise the chemical destruction is retarded and at length entirely checked. Therefore, decalcification is in exact ratio to the amount of chemical force applied.

DR. ROBINSON: I have one serious objection to the paper: it is too short at one end.

THE PRESIDENT: This you may say is the only paper we have had under this head since the Association was organized The question is somewhat new.

DR ROBINSON: I would like to ask the gentleman a question: What is his theory with regard to the formation of salivary calculæ?

DR. ASAY: Mr. President, the only theory that I can give is by the taking up of lime salts in the mouth, the earthy salts, and depositing them around the necks of the teeth.

DR. ROBINSON. That is a fact but not a theory.

DR. ASAY; Well, the fact demonstrates the theory: if you mean the chemical rationale of the operation, I am not sufficiently prepared to explain it at present. I have not looked into it carefully enough to explain the changes that take place.

DR. KNOWLES: I think, perhaps, I can answer the gentleman;

the calculæ are formed principally of the phosphates of lime, soda and magnesia; chiefly of lime. The phosphates are excretory; they are in all fluids, in all the excretions to a certain extent. Quite a large proportion is eliminated through the kidneys of this same material. The reason it is precipitated is this: it is held in solution probably by the carbonic acid gas, or at any rate if not by reason of the acidity of the secretions, whenever it it is allowed to stagnate, or is brought in contact with an alkali the precipitation takes place; it is not a simple stagnation that causes it to precipitate, but the organic constituents are undergoing changes which eliminate alkalies, and the precipitation takes place on account of the inability of the fluid to hold them all in solution. This thing can be readily verified by taking urine and boiling or adding an alkali, and the precipitation can readily be seen, which proves it to be nothing but phosphates and not of an albuminous nature. The reverse test can be applied by acidulating it, and the fluid will readily be cleared up. It is merely a concretion; the tartar, as you all know, will collect about anything in the mouth: it will collect on an artificial plate or any foreign material in the mouth, and it is brought about in a way almost similar to the way in which the precipitate is brought about. When hard water is boiled, in that case the sulphate of lime is held in solution by the infiltration of carbonic acid gas, and the boiling simply drives off the suspending medium, and of course earthy salts no longer being in solution, but taking on their atomic or molecular form are precipitated, and even sometimes going to the extent of adhering to the membrane, not making it necessary for a solid body to be present. I know for certain that this takes place in the bladder, and we have every reason to believe that, under favorable circumstances, this may take place in the mouth. It is true that the parts are more mobile and easily cleaned, but we certainly sometimes find concretions around the teeth. A favorable illustration of this theory, or at least a portion of it, is in breathing into lime-water. It is a restoration of the carbonic acid that comes from the lungs. Any one can try the experiment very easily by taking lime-water and breathing into it, and in a very few minutes there is quite a precipitate formed by the union of the carbonic acid and the lime; that is quite a different

reaction, that is where the carbonate of lime is formed. The reaction I was referring to is where the carbonates are held in solution by a solution of carbonic acid gas in the water. The experiment referred to is a precipitation of the hydrated oxide by its conversion into a carbonate of lime. It is just the reverse; in one case the driving off of the acid, precipitates the sulphate of lime, and in the other carbonic acid gas from the lungs combines with another salt of lime and forms a carbonate, and that is thrown down and forms a precipitate.

I might state in this connection, in the case of ranunclæ, where there is a true stone in any of the salivary glands, or any of the ducts, that the nucleus is invariably found to be foreign; the centre about which the concretion takes place. I think that the formation of a stone without the foreign nucleus is unknown, and it seems to be almost necessary for it to exist. In the mouth, of course, the teeth furnish these nuclei.

DR. LANE: I would ask Dr. Knowles to explain why the tartar deposit is so profuse in some mouths, while it is not so profuse in others; is it from the fact that there is a superabundance of the alkalies in the system, or is it from some other cause? I mean where there is actual care exercised in the cleanliness of the mouth, etc.

DR. KNOWLES: Well, I would state that the amount of deposit is usually in inverse proportion; if the mouth is kept clean there are two general kinds of tartar. Where we find these immense masses of white chalky tartar they are usually in connection with a particular form of dyspepsia; all the parts of the body being loaded with phosphate of lime, there seems to be more secreted from the body than usual, but the amount depends somewhat upon the alkalinity of the secretions of the mouth. It is like this, say for instance, that a certain number of grains were secreted in a day; the fluid is immediately passed into the stomach or passed entirely from the body; of course there is no precipitation; the whole thing remains in solution all the time and none will appear at all; then we shall have a kind of negative proof that there was none to deposit; but if on the other hand the same amount was in the system, and they should be held in the mouth long enough to have them degenerate

or to become alkaline, or if they should be brought in contact with alkaline saliva the whole or a very large portion might be precipitated, and in that case, of course, we get it.

DR. LANE: How is it, Doctor, we have active decay in the same mouth evidently from the effects of the acids before we have alkalinity.

DR. KNOWLES: That is very true; we do have active decay in the same mouth, but not in the same place; tartar seems to be a kind of antidote, the parts being covered with the tartar the decay necessarily ceases.—[*Trans. Cal. State Dental Association.*

SALIVARY CALCULUS AND ITS CONCOMITANTS.

BY GEORGE WATT, M. D., D. D. S.

[Read before the Ohio State Dental Society, December, 1879.]

When, in the present state of civilization, the olfactory nerves are detailed as detectives, individuals are found bearing to society the relation of lively corpses, who walk erect, as it were, to save funeral expenses. Their accompanying odors suggest an escape from the charnel-house, or the "stiff-room" of the anatomist. And yet these persons will smile in your face, their snaggle-toothed mouths suggesting a cage of every unclean and hateful bird, not excepting even the gormandizing buzzard. They will talk you deaf in hollow tones, which testify that "their throat is an open sepulcher." And the energy with which they transmit and maintain disease in every tissue of their own bodies, from cell to cerebrum, proves that "the poison of asps is under their lips."

But what is to be done about all this? and who shall do it? These victims are our brethren and sisters, our sons and daughters, our wives and ourselves. So prevalent, so common is this condition, that it has come to be regarded as an essential in civilization, and its victims go into society without a thought of their unpresentable state; or at most, they attempt to disguise their stench by something which smells still stronger.

The phenomena pertaining to these victims are oftener noticed

by dentists than by physicians, perhaps because the former, from the nature of their practice, are longer and closer in contact with their patients; and, further, because one of the leading local manifestations of this condition is recognized as pertaining to dental, rather than to general surgery. I refer to the morbid state, popularly known as scurvy of the gums, with deposit of salivary calculus, or tartar.

There is constant warfare between vital force and chemical force. The great trial, ever in progress in the Court of the Universe, may be entered on the docket as Affinity *versus* Vitality. When vitality gives up the contest, with reference to any individual life, we are familiar with the vengeful activity with which the plaintiff crushes and grinds his victim; and, fast or slow, as the case may be, like the mills of the gods, he "grinds exceeding fine."

But, to drop metaphor, it is a mistake to suppose that chemical affinity triumphs over vital force only after the death of the individual. For it is well recognized by pathologists that vitality is often so much enfeebled that elements, and even compound radicals, are separated from tissues during the life of the patient, when, in obedience to their affinities, as modified by surrounding circumstances, the remaining elements form new compounds, which may be either healthful or hurtful to the patient. To mention many illustrations of this fact would prove too tedious for our present purpose; but take a familiar case, such as the part played by sulphur, both in health and disease, in the human constitution. A trace of it seems to be necessary to the formation of the protein compound, such as albumen, fibrine, etc. While vital force is at par, all is peace, both with this element and the tissues it helps to form; but let vitality be depressed, till affinity is able to overcome its influence, oxygen being usually the first to make new inroads, the various elements seek new combinations, and one compound formed, under such circumstances, is *sulphuretted hydrogen*—a poisonous acid, gaseous with ordinary pressure—which is capable of destroying the functions, and even the life, of the red corpuscles, by its sulphur taking their iron, thus rendering them unable to give force for organic life. When the sulphur thus takes iron, it lets go the hydrogen, which may combine with the phosphorus of the protein compounds, forming another poisonous, gaseous acid, as deleterious as the one just described; or

the hydrogen, thus liberated, or that liberated in any way, may, and generally does, combine with nitrogen, forming ammonia—an alkali less poisonous, perhaps, than the acids above referred to, but still capable of great mischief when thus disseminated in the blood. We thus see that hydrogen, in seeking new combinations, forms two acids and an alkali. Any one of these may be formed, or all may result simultaneously; and in such case, the well known mutual affinity of acids and alkalies is asserted, and combination takes place. These hydrogen compounds are all gaseous at ordinary temperatures, and each has a highly offensive odor. Of course, then, a mixture of all three cannot fail to highly offend the olfactories. But when free, their odor, singly or together, is mild compared with that resulting from their combinations. An intense stink results from the combination of either of these acids with ammonia.

I think every member of this Society can recall cases in which the breath, the perspiration, or both, have been loaded with one or more of these hydrogen compounds. This ought not so to be. In perfect health it is probable that all the ammonia given off should escape by way of the kidneys. When given off by the respiratory organs, the patient is dying to the extent manifested by this putrefactive process. He may object to cremation, and refuse to be buried; but he is dead, nevertheless, to the full extent of the stink.

When this condition has been reached, the constitution of the patient has lost much of its resisting power, and degeneration of tissue rapidly results. In the organs most liable to inflammatory action, the degeneration of tissue is likely to manifest itself earlier than in others; but degeneration, in one of its degrees, at least, is likely to be found throughout the entire system.

Several varieties of degeneration are recognized by pathologists; for instance, the fibrous, the granular, the fatty and the calcareous. In dental surgery, it is probable the granular is oftener noticed than the others, though I have seen all four well defined in the same mouth. It is not proposed to consider the nature and consequences of each or all of these varieties of degeneration; but the aim is to notice a single result and its concomitant circumstances, as they are brought to the notice of the dental surgeon, in the morbid condition in which there is degeneration of the gums and sockets, with deposit of salivary calculus, or tartar.

It is not necessary here and now to give an analysis of tartar. That it is composed of lime-salts, with organic matter containing nitrogen, is enough to know for the present purpose.

It is well known to every member that carbonate of lime (chalk, marble-dust, etc.), is not soluble in water; and yet, in this vicinity, and in much of our country, this salt is abundantly dissolved in the water of our wells and springs. It is also well known that carbonic acid (a gas, ordinarily) is soluble in water to a moderate extent. When thus dissolved it is no longer gaseous, but has assumed the form of a liquid. The water of our wells and springs is nearly saturated with this gas, which may be removed from it in various ways. When the water is heated the acid escapes as a gas; and when thus treated, several phenomena occur. One—important to be noticed here—will be better understood after stating that water, thus holding carbonic acid in solution, is able to dissolve carbonate of lime, as well as some other salts. When the acid is expelled by heat, the lime-salts are precipitated, because the water, unaided, can not hold them in solution. This is constantly illustrated by the conduct and condition of the family tea-kettle. But, if, instead of removing the carbonic acid by heat, we separate it by an alkaline base, the lime-salt is precipitated all the same. A solution of soda or potash will give this result, as will also ammonia, whether gaseous or in solution. Any of you can demonstrate this by the most simple experiments.

Carbonic acid has constant access to the saliva, which dissolves it to the point of saturation. When thus charged, the saliva is able to hold the normal quantity of lime-salts in solution; but if, by any process, the carbonic acid is removed, these salts are precipitated.

Now, take into consideration the condition of the putrefying patients above described, and you will find that ammonia is present in the buccal fluids. This, an alkali, takes the gas, an acid, thus forming carbonate of ammonia, leaving the fluids no longer able to hold the lime-salts in solution, and they are precipitated in the form of tartar. As the salts are being precipitated, they entangle mucus (and perhaps other organic matter) and, as this putrefies, more ammonia is formed, giving thus a second source of mischief from this deleterious gas.

To break up the tendency to deposit tartar in any constitution, then, it is necessary to obviate the tendency to the formation or lib-

eration of ammonia in the mouth. I say *formation*, or *liberation*, for it may be present in the mouth from either or both of these sources. It may be given off as a secretion, or rather as an excretion, from the salivary glands; and it may be, and, indeed, always is, formed by the putrefaction of the organic matter contained in the salivary calculus. The porosity of tartar insures the absorption of any or all liquids placed in contact with it; and the condensation of gases, and, therefore, oxygen, is as well assured from the same causes. Thus condensed, the oxygen and nitrogenous matter are brought more thoroughly within the range of affinity, and, by taking one constituent to itself, the oxygen liberates the other elements, which, in seeking new associations, always give hydrogen in combination with nitrogen, which is well known as ammonia. And, as long as this is formed, so long will the lime-salts be precipitated from the saliva, because the dissolving agent, carbonic acid, is taken by the ammonia, and the well known phenomenon, the deposit of tartar, will be recognized.

It follows, then, that even the most careful and thorough removal of the tartar is not all that is needed by the patient. True, this removal will do very much to prevent the presence of ammonia, but it cannot do all. The sensible physician would not expect to cure typhoid fever merely by even the most careful removal of the patient's excrements from the sick-room; but he certainly would not attempt the cure by allowing them to accumulate and remain therein from day to day.

As long as the fluids of the mouth are neutral in their re-actions, there can be no deposit of tartar. But our profession, in recognizing dental caries as our opprobrium, and bearing constantly in mind that the immediate cause of caries (of each variety) is to be found among the acids, have, thoughtlessly, I fear, settled down to the opinion that, if a neutral state of the buccal fluids promises exemption, an alkaline condition gives still stronger promise of immunity. But it is doubtful if a greater mistake has ever been entertained by us.

In the local treatment for the condition described, it is necessary to carefully and thoroughly remove, not only the tartar, but also the remains or *debris* of the degenerated periosteum, as far into the sockets as this degeneration is complete; for its restoration to health

after it has reached even granular degeneration is not practicable in our present state of scientific attainment. And right here the profession is much indebted to Doctor Riggs for so earnestly inculcating thorough local treatment, as well as for the introduction of improved instruments for the removal of this morbid and degenerated matter. It is unfortunate that so many of our brethren rely more on recipes than on basal principles; and it is much easier to remember that the tartar and other dead matter should be scraped away, than it is to make proper diagnosis, and to prescribe such therapeutic and hygienic treatment as will lift the constitution above the morbid state that cannot fail, if continued, to cause deposit of tartar, absorption of the gums and sockets, loosening and loss of the teeth, impairment of digestion, general failure of health and shortening of life.

I feel confident that you will all agree that, after the period of youth has passed, a dozen teeth are lost by the morbid state under consideration for every one lost from other causes. This is the fact that makes the subject so all-important. And its great importance is the explanation of my conduct in devoting so many hours and days to its investigation, by both research and experiment. My persevering earnestness in persistently calling your attention to it, year by year, is also explained in the same way, as is the fact of my writing this while too ill to do so.

You all recognize and lament the condition I am describing. If, now, you recognize its immediate, as well as its predisposing causes, we are ready to suggest intelligent treatment. Short of such recognition, we grope in the dark, and our treatment is, at best, empirical. That there may be no tartar deposited, the saliva must remain saturated with carbonic acid. This cannot be when ammonia is formed by putrefaction, within the mouth, nor when it is given off by the salivary glands. It follows, then, that the care of the general health is essential to the preservation of the teeth; and, when we are properly developed and cultivated, right here is where our profession is to be regarded as a branch of general medicine and surgery. How the knowledge necessary for the proper practice of the specialty is to be obtained, has nothing to do with this question; for when it has been reached, it forces recognition as certainly as does gravitation. Quacks and others, in both departments, may fall short of such attainments; and they may fail to be recognized; but they are

not the profession. The general practitioner may point the finger of scorn at the ignorant dentist, who may be just what he calls him—a pretentious tooth-carpenter—and ask if we expect to be regarded as professional brothers, while such is a specimen of our craft. But we, in return, might inquire if they expect recognition from us while "the genuine Old Doctor Jacob Townshend," and "the aged minister whose sands of life are nearly run out," are general practitioners?

But to get rid of the deposit of tartar and the constitutional condition that gives rise to it, the system must be built up as thoroughly as possible, so that the vital force may "hold the fort" against the encroachments of affinity. And here, if not yourselves competent to prescribe, yon will find it necessary to obtain the aid of the family physician; and if he and you are what you ought to be, you will be able to co-operate. And, as it is an alkali that takes the carbonic acid from the buccal fluids, and thereby causes the lime salts to be precipitated, we must try to get rid of this alkali—neutralize that which is already formed and present, as well as prevent the formation of more.

After what has been already said, do you not all think of acids? and, if so, what acids? and how should they be used?

It is very common in this condition to prescribe the mineral acids, such as elixir vitriol, the dilute sulphuric, nitric or muriatic acids. At least, such course is very common with physicians, who seldom even take into consideration, as an element or phenomenon of the disease, the deposit of tartar. As defective biliary secretion is usually present in this condition, these mineral acids often do good by stimulating the liver, as well as by neutralizing the alkaline condition of the secretions. There is but little choice among them—the elixir vitriol (aromatic sulphuric acid), having a slight advantage in taste, is often preferred. It may be given three times a day, in doses of ten to twenty drops, till the difficulty is removed.

But, in general, I prefer the vegetable acids, to be used as food or condiments. The citric acid (found in the lemon and elsewhere) is excellent, and at the same time so palatable, that the patient is all unconscious of the fact of taking medicine. And we all know that a stomach undisgusted will all the better perform its functions.

It is an axiom that "the best is the cheapest;" but the cheapest is not always the lowest priced; fortunately, in the case before us, however, we find it so; for, to obviate this alkaline condition, acetic acid is the most efficient of all. Good vinegar is all that is needed to correct the morbid condition, so long as it is simple. If the patient's debility has continued till organic or other morbid changes have taken place, of course, these conditions must be met and treated according to their nature. But, by judicious use of vinegar (or pickles, if you please), the condition which deposits tartar need never be reached.

But now comes the question: "Who did sin? this man or his parents, that he was born" to lose his teeth? In other words, we must never forget the force of heredity, in our consideration of this disease. If you know that parents have lost, or are losing their teeth in this way, be doubly diligent with the offspring. Point out the danger, instruct as to the preventive and remedial measures indicated, give assurance and confidence as to the certainty of relief, when the proper course is rigidly followed, and you will prove yourselves to be benefactors to your fellowmen; and when the great human race has been run, you will be crowned as victors, and the Judge will say, in presence of the assembled universe, "Ye did run well."

And now, brethren, this paper is not what I expected, far less what I hoped to give you. But, till it was written, I felt that my professional work was unfinished. Now, I feel that it is done, but am sorry to be unable to add, well done. This has been prepared amid much weakness; but further postponement and abandonment had come to be synonymous terms; and so, here is the paper.—[*Trans. Ohio State Dental Society.*

PLASTICS.

AMALGAMATING ALLOYS.

Without doubt, too much mercury is used in amalgam plugs. The best results are obtained by using as little as will accomplish the object of uniting the various metals into one crystallized mass. The

proper quantity can only be ascertained by trial. Different alloys require different weights of mercury. The precise quantity can only be found by weighing both the mercury and powder. Every dentist should have a light balance, with grain-weights. They can be ordered from dental depots at a cost of about a dollar and a half.

Some dentists will prefer to purchase the "Differential Balance" of Fletcher, which is sold at the depots for one dollar.

Too many dentists make amalgam in a very unscientific manner, and then they, perhaps, find fault with the alloy of which they made it.

We must not cheat our patients, and we must not cheat ourselves; but we do both when we do not *try* for the best results.

Until lately I have mixed amalgams in my hand. I now mix them in a glass test-tube. This I have done from the recommendation of Dr. Fletcher, of England, who has given us so many good things. His glass mixing-tube can be procured at the depots for fifteen cents. But a long glass vial, say three inches long by half an inch in diameter will do, and can be had at the druggists'. Weigh your mercury and put it in the mixing tube; now put in the alloy filings, and placing a finger over the mouth of the tube, shake the latter some time. After awhile every particle of alloy has its quota of mercury adhering to it. The whole may now be shaken out and made into pellets. The pellets ought to be very tender and break up easily, otherwise they contain too much mercury.

Fletcher makes a boxwood-mould, for moulding amalgam pellets, which is very useful; its cost is thirty cents at the depots.

By *moulding* the pellets they can be more easily conveyed to the cavity.

An alloy which I formerly used in the proportion of 2 alloy, 1 mercury, I can now use in the proportion of 3 alloy to 1 of mercury. This has been accomplished by

The Balance,
The Tube-Mixer,
The Moulder.

HENRY S. CHASE.

ST. LOUIS.

JOURNALISTIC.

[Under this head it is our purpose to present the readers of the MISSOURI DENTAL JOURNAL with a brief review of the articles of chief interest met with in our exchanges, together with such comments, suggestions and references as will serve to elucidate the subject to which they respectively relate.—L.]

THE "Dental Cosmos" for January opens with an installment of Dr. Bödecker's paper on "Pericementum and Pericementitis." To be appreciated it must be read entire. When the doctor has finished the work in hand we hope to see something of his method of preparing dental and other tissues for microscopic examination.

Prof. Flagg directs attention to peridental trouble brought on by forgotten or unobserved ligatures, rings of rubber tubing and pieces of rubber dam. He escapes the possibility of such trouble by using long-end ligatures, attaching threads to the rings, and closely examining the sheet-rubber after its removal from the mouth. Profiting by what he had heard of the tendency of rubber rings to outroot teeth to which they had been applied for another purpose, he "*extracted two teeth* for patients of hemorrhagic diathesis by this method, combating, by local applications, any undue irritation."

Dr. Palmer writes on "Secondary Decay." He accepts "*in part* the statement that 'teeth, after having been filled, are subject to the same influences and destructive agents as formerly, and nothing more.' This '*nothing more*' is the point of contention." The introduction of the filling changes the condition, and the prospects of the teeth are improved or made worse according to the conductivity of the filling material, and the nature of the fluid in which the tooth is bathed. He claims to "have been particular from first to last to place gold *first* as a filling material, and to use it when it seemed desirable and consistent with the preservation of the teeth. This fact has been lost sight of by those who oppose the electro-chemical theory."

Dr. Mills continues to tell "How to Keep Teeth Clean and Beautiful." Of Sozodont he says, "I will testify to what is so well known to most dentists, viz., that it destroys the color of the teeth, turning them to a decidedly dark-yellow." Question: Is this "dark-yellow" color due to the use of Sozodont, or to that increased den-

sity of tooth-tissue that comes of age? As a rule this change is not observed till *years* after having begun the use of the dentifrice in question.

Thirteen years ago we clipped the following from an exchange and filed it for reference:

SOZODONT.

Liquid:—Alcohol, water, soap, essential oil, sugar and a little extractive matter.

Powder:—Starch, gypsum (plaster of Paris) and powdered orris-root.

The analysis was by T. E. Jenkins, M. D., of Louisville, Ky.

If this analysis will apply to the Sozodont of to-day, that article (nostrum that it is) may not be as bad as some would paint it.

Dr. Bronson's paper on the "Protective Lining of Cavity-Walls," was read before the N. Y. Odontological Society. Certain things in relation to the causes of failure in simple metallic fillings had compelled him to alter his former methods of filling, very materially. He says, "Some years ago I made gold fillings, in smooth cavities in a steel plate. * * * I certainly expected that these fillings, inserted with all the skill and care of which I was master, would present surfaces as smooth and polished as the walls of the cavity in which they were constructed; and, to the eye, they did so. But a glass made apparent such dints, cracks and crevices in these fillings as fairly astounded me.

"A further examination of the walls of cavities in teeth, excavated with like care, showed even greater unevenness. * * * When I realized these facts, I asked myself, what can be expected of fillings which are thus constructed? When, in a cavity with polished steel walls, gold is not ordinarily packed so as to obtain an equally smooth and polished surface, what shall we expect when we place a metal filling in a cavity where the *walls also* are pitted and crevviced? The result will certainly be a doubling of imperfections at the very point where we desire—where we *must have*—perfection."

He mentions as a serious objection to simple metallic fillings when placed directly against the tooth that of variation in dimension through thermal changes. Any increase in the size of the filling must effect breakage of tooth-structure, and any decrease must provide means of ingress for the oral secretions.

Another objection to metal in direct contact with the tooth is its incompatibility with living tissue. By "incompatibility" is meant "that power, possessed by many materials, of exciting efforts in the living organism to expel the foreign substance, or to protect the tissues from its irritant action."

To reduce to *nil* the objections to metals and tooth-tissue in direct contact, a method may be found in the *conjoined employment of plastic and metallic filling materials* in all *cavities*. The principle of this method lies simply in lining the walls of the cavity (except at the enamel edges) with a varnish or a plastic filling material against or upon which the metal is placed.

The following plastics are recommended as linings: Gutta-percha, alone or dissolved in chloroform, the oxy-chlorides and oxy-phosphates. Varnishes, Canada balsam in chloroform, sandarac in alcohol, copal in ether. The last is spoken of as "superior in almost all respects."

Dr. Trueman's paper before the Odontographic Society of Pennsylvania, "The Causes of Crowded Dentures and Irregularities," shows fight against the theory of man's physical degeneracy, particularly in regard to his teeth. If we understand the writer, he believes thoroughly in the persistence of the normal number and arrangement of teeth in man, notwithstanding the fact that man's environment has undergone and is undergoing radical changes. Mode of living and matter and method of eating, it seems to us, have much to do with determining the number and arrangement, as well as the structure of teeth. If mastication is the primary function of the dental organs, any change in the material manipulated by them must call for a corresponding change in the organs themselves. Time, of course, is an important element in the problem. A decade, a generation, a century will work *some* change, but to get the full benefit of time it must be reckoned in ages. Throughout the animal kingdom adaptation of teeth to food is a commonplace fact, and the suppressed teeth of some of our domestic animals, the descendants of others in which the homologues of the suppressed organs are fully developed, is a standing argument in favor of the theory that the dental apparatus of man *may* change, and, coupled with other facts, *is* changing. The paper will bear study, whether the argument is with or against the reader's views.

THE "British Journal of Dental Science" for January opens with an article by C. D. Davis, Esq., "On the third Molar." The writer differs very materially with Dr. Trueman in his estimate of the prospects of the tooth in question. He regards it well on the way to extinction, and speaks of the researches of Mr. Mummery "as showing the tendency for the third molar to disappear in weaker races."

In his address before the Odonto-chirurgical Society, the president says,

"Unfortunately in this country the door is shut against the graduates of the Transatlantic Dental Colleges. This barrier, doubtless, will soon be broken by compulsory education becoming a law in the United States. Nothing short of this will enable the Dental Colleges to enact such educational statutes as will place their graduates on an equal footing with those of this country."

As to compulsory education, we have about as many laws as are needed and more than it is possible to enforce. If the worthy gentleman will look about him at home he will probably find abler men outside of the law-making body than in it, and that these men will show him ten ways to evade a law where he can show one to enforce it. In this country, compulsory educational laws are applicable only in primary education. As applied to other departments, they are regarded as in the interests of the few; that is, class legislation—the very worst that can possibly curse a nation Democratic in principle and Republican in form.

That part of the above extract that would place American "graduates on an equal footing," etc., is a little obscure. If it has reference to *legal* qualifications in England, well and good; it is proper for a government to fix its own tariff and enforce the collection of customs. But if it has reference to the *professional* qualifications of American graduates as compared with our cousins L. D. S., we have nothing left to do but smile.

Farther on the President says something, that croakers on the dire effects of modern civilization ought to cut out and pin in their hats:

"It is much to be regreted that the necessity for dental skill is so greatly on the increase; but while humanity remains in its present condition, with its love of luxury and pleasure, and all the concomitants of what is usually called civilization, it is more than likely

to continue. But that medical science will ever lend much aid to nature in the structure of the teeth previous to their eruption I do not believe, except in so far as the enforcement of hygienic laws comes under that term."

This suggests the propriety of at once adapting ourselves to civilization as we find it, rather than waste time in the vain attempt to upset or turn it back. A much respected gray-haired friend of the writer always ends his half-yearly speech on the observance of hygienic laws, with the sage remark that "the proper time to begin to build up good teeth, is within a day or two of nine months before the child is born." Not a bad idea.

At the opening of the Edinburgh Dental Hospital and School the Lord Provost introduced Mr. Imlack, "the first president of the Royal College of Surgeons elected from the ranks of the dental profession." This gentleman, in the course of his excellent address, makes the following modest statement: "I may add, that it is to them (American dentists) that we owe several of the improvements which are in vogue at the present day." *Several;* well, we may not be exact in the following, but are quite certain that we cannot be far out of the way:—There is vulcanite, celluloid, cavity plate, plaster of Paris for impressions, nitrous oxide and sulphuric ether as anæsthetics, arsenious acid as a pulp-devitalizer, the rubber dam, the dental engine, disks of various kinds, automatic engine and electro-magnetic pluggers—but, we give it up—space will not permit us to go on.

Lord Rosenbery, the president of this institution, in proposing Mr. Imlach a vote of thanks, volunteered the following: "At the same time the American dentists had difficulties to contend with, which he hoped their dentists had not. The practice of chewing was very prevalent in America and could not but be very injurious to the teeth. He believed that the practice was dying out in Scotland, but he had seen an American take a handful of tobacco out of his pocket and cram it into his mouth as if it were food." We do not know that his Lordship would believe it if we were to swear upon honor, but it is nevertheless true, that an acquaintance, in going through the stock-yards, *actually saw a hog eating out of a trough in which other hogs were soaking their feet.* Those vulgar Americans, you know. Deuced clevah though, by Jove.

The correspondence department carries the idea that less time devoted to determining their "status," and more to the cultivation of respect for those who happen to think the other way, might not be wholly wasted.

AMOUNT OF DENTISTRY DONE IN THE UNITED STATES.

By J. N. Farrar, M. D., D. D. S., Brooklyn and New York.

That people are becoming aroused upon the subject of decayed teeth can be seen from the employment of twelve thousand dentists in our country (United States) who, according to the best authority we have, are annually packing into the cavities of the teeth no less than about half a ton of pure gold, costing about half a million dollars. It is estimated that there are at present (1879) in the United States about one hundred and fifty millions of dollars in (gold) coin. Now at the rate at which gold is being consumed in filling teeth, it will only require three hundred years to bury the present amount of gold in this country into graveyards. Besides this, there is probably in weight four times as much cheaper material, such as silver, platina, &c., used for filling cavities in teeth, which may safely be estimated at not less than one hundred thousand dollars, all of which in itself would amount to quite a large sum in the course of ten or twenty years ($1,000,000 to $2,000,000).

In the United States there are annually made about three million artificial or porcelain teeth, mounted on various kinds of plates, gold, platina, rubber, &c., which help to keep the busy fingers of the dental profession at work. What is more wonderful, however, is that not half of the people *who need it* avail themselves of their services.

From statistics taken in America, it has been ascertained that out of an average of about eighty people of all classes as we find them, only one can be found with perfect dental organs. All the rest are troubled more or less with decayed teeth. What an army of bandaged faces there must be pacing the floor in writhing torment every night, and yet some dentists wonder why the "Coltons" flourish while *they* do not; a query which it seems evident enough to me can be

easily solved, and a change which is certain to be made when the profession shall take proper and liberal steps for a more general enlightenment of the masses of the people, upon the subject of the importance of natural teeth.—[*Dental Office and Laboratory.*

MISCELLANY.

HUMAN AND CANINE BLOOD CORPUSCLES.—The question whether it is possible to distinguish between dog's blood and man's blood by microscopic measurements of their respective corpuscles was pretty strongly negatived by the evidence given in a noted murder trial by Dr. Woodward, of the Army Medical Museum at Washington. Dr. Treadwell, of Boston, had previously stated, in the same case, that he had identified certain blood-stains on a pocket-knife as human blood by means of such measurements. Dr. Woodward, on the other hand, contended that such identification was impossible.

The corpuscles of the blood of man and dog vary within very wide limits, and corpuscles vary according to the health of the individual; a French investigator had discovered some in persons afflicted with anæmia as large as 1-551 of an inch; another 1-500; however the witness had never found one so large, his experiments giving measurements from 1-2500 to 1-4500; the corpuscles of dog's blood vary little from those of man's, but the largest or smallest sizes are not always to be found in any single drop from any animal. It has been claimed that there was no difference in the corpuscles of young or old; but Perrier, of Bordeaux, wrote in 1877 that the two extremes of size disappear as age advances and the corpuscles become uniform. Dr. Woodward had investigated this theory so far as it applied to man and the dog, and believed it correct; this applies to age; the variations caused by disease are yet an open question. Between the extremes all measurable sizes exist, varying even to millionths of an inch, the corpuscles in a drop of blood varying as much in size as different men do in a throng. Therefore when you try to get an average from four corpuscles or fifteen corpuscles you cannot do it any more than you can get the average size of men in a throng by measuring a few of them.

Therefore it has happened that scientific men in their investigations do not get results comparing with each other; a noted investigator, Mr. Gulliver, in 1848 stated that the average size of man's corpuscles was 1-3200 of an inch, but Pellus and Franie, French investigators, found them slightly larger, and other Frenchmen found them smaller; what varies in nature must, of course, vary in the results placed upon paper, continued the witness, who admitted that he had never been able to get the same results from measurement of the corpuscles in two different drops.

At this point the witness referred to a paper written by him in 1875 for the "American Journal of Science," and giving thirteen sets of measurements of human corpuscles; those of each set of 50 were averaged, he said, and the average of the aggregate was 1-3500 of an inch. These figures he had since criticised in print as being not absolutely correct, yet many European authorities still agree with them. Continuing, he remarked that as a drop of blood contains between five and six million corpuscles, in endeavoring to identify blood one must think of how many drops there are in a human body, and consequently how many millions of corpuscles. Hence we see how impossible it is to identify blood by measuring fifty corpuscles.

In reply to a question as to the relative sizes of dog's blood and human blood, Dr. Woodward detailed some recent experiments. One with forty corpuscles of the blood of one of his assistants in the Medical Museum in Washington, showed an average of about 1-3058 of an inch. Fifty corpuscles of dog's blood averaged only one-millionth of an inch from the average of the forty of human blood above described. Upon the subject of restoring to their normal size for measurement the corpuscles of dried blood, Dr. Woodward said that there were numerous difficulties which tended to prevent accurate work. When restored they are generally smaller than their normal size, and would therefore appear to come within the ranges of the corpuscles of other species; the best restorative is that nearest approaching the serum of the blood, and that is the embryotic fluid surrounding the fœtal calf; glycerine with water gives good results in careful hands.

In reply to the question whether other diseases than anæmia affected the size of blood-corpuscles, Dr. Woodward said: A state-

ment is going the rounds of medical literature that all fevers do; however, one of my colleagues has examined the blood of a person who died of yellow fever and found no difference. The fifteen corpuscles discovered by Dr. Treadwell and testified to in the case under trial were within the range of human blood corpuscles, but they were also within the range of dog's blood.

Said the counsel, "You don't agree absolutely, Doctor, with any of the line of eminent experts of Europe or America who were mentioned this morning?" A. "No, sir, for my own averages of measurements can never be made to agree."

"Why?"

"Because of the differences of the things measured—the corpuscles."—[*Scientific American.*

UNIQUE VARICOSE DISTENTION IN THE PAROTID REGION—DIFFICULTIES OF DIAGNOSIS—A farmer from Illinois, aged twenty five years, exhibited a well-defined tumor in the left parotid region of sixteen years' standing. It excited considerable interest on account of its variable size, long duration and the discordant opinions rendered by a number of qualified practitioners as to its nature.

The tumor extended from the zygomatic arch downward five inches by two and one-half in width; was oval in shape, soft, and surrounded by healthy integuments. It evidently contained fluid, but not in sufficient quantity to make it tense and elastic. Its size was diminished by firm pressure over the surface and increased by the patient bending his head forward and downward, the fluid seeming to escape to and return from deeper parts, notwithstanding that the tumor was located without the ramus of the lower jaw.

Close manipulation produced no pain, but disclosed the presence of a small hard body within the sac of the tumor. Compression of the tumor caused an increased flow of saliva. A fine probe was passed into the duct of Steno several inches, so that its point would be felt in close proximity to the tumor, but did not enter the cavity. To solve the mystery, Prof. Baur entered the tumor with a hypodermic needle, and drew off a sample of its contents, which proved to be *venous blood!*

The tumor is then, in reality, a venous distention, a *varix*, which we did not anticipate at such a locality. We do not remember having met in literature a similar instance, nor were we prepared to meet it on this occasion. Candidly speaking, we had anticipated pent up saliva from transient mechanical obstruction, and we looked upon the foreign body detected in the sac as the original cause, though we failed to explain the escape and return of the fluid by that diagnosis. We could not fall into the same error as some of our confreres of mistaking the tumor for aneurism, since there is no pulsation or bruit noticeable, nor do we find circumferential induration of the sac, which we should expect to find in an aneurism of such long standing.

The prognosis seems to us not unfavorable. A spontaneous rupture of the varicose sac is not to be expected, since there is no inflammation or attenuation going on in its neighborhood, nor is it growing, according to the statement of the patient, and since he suffers no inconvenience from the growth, he probably will prefer masterly inactivity to any interference.

In all probability, the difficulty arose in valvular defects, but since we shall have no opportunity to fathom the pathology, we do not choose to substitute hypothesis. If the patient desires it, we will try the subcutaneous injection of ergot around the varix, for which we have the authority of B. Langenbeck and others. How the remedy effects the closure of such large cavities we do not know, but that it does it has been assured by trustworthy observers.

It would be an easy task, by a Galvanic current, to prompt the coagulation of the blood, but, so near to the heart, we are apprehensive of embolism. An operation would only be warranted under impending danger, which at present is far from existing. We are fully persuaded that the varix is connected with branches of the internal jugular vein, since we have not succeeded in interrupting the supply by compression above the tumor, nor increasing its distention by compressing the external jugular.[—*St. Louis Clinical Record.*

THE WONDERS OF A CIGAR.—An analysis of the weed is enough to strike terror into the ranks of the smoker, even to him who, with

Bulwer Lytton, says, "He who does not smoke has either known no great sorrow or denies himself one of the softest consolations of earth." Science is a ruthless iconoclast, and any one who doubts it has but to read the following from the "Caterer:"

"To the world in general the cigar is merely a tightly-rolled packet having brittle fragments of dry leaves within, and a smooth, silky leaf for its outer wrapper. When it is burnt, and the pleasantly flavored smoke inhaled, the habitual smoker claims for it a soothing luxury that quiets the irritable nervous organism, relieves weariness and entices repose. Science, scouting so superficial a description, examines first the smoke, second the leaf, third the ash. In the smoke it discovers water in a vaporous state, soot (free carbon), carbonic acid and carbonic oxide, and a vaporous substance condensable into oily nicotine. These are the general divisions, which chemists have still further split up, and in so doing have found acetic, formic, butyric, valeric and proprionic acids, prussic acid, creosote and carbolic acid, ammonia, sulphuretted hydrogen, pyridine, viridine, pidoline, lutidine, collodine, parvoline, corodine, and rubine. These last are a series of oily bases belonging to the homologues of analine, first discovered in coal-tar. Applying chemical tests to the leaves, other chemists have found nicotia, tobacco, camphor or nicotianine (about which much is not known), a bitter, extractive matter, gum, chlorophyll, malate of lime, sundry albuminoids, malic acid, woody fiber and various salts. The feathery white ash, which in its cohesion and whiteness is indicative of a good cigar, yields potash, soda, magnesia, lime, phosphoric acid, sulphuric acid, silica and chlorine. The ingredients extractable from a poor and cheap cigar would be fearful and wonderful to contemplate. Here is a list from a Parlimentary Report on adulterations in tobacco: Sugar, alum, lime, flour or meal, rhubarb-leaves, saltpetre, fuller's earth, starch, malt combings, chromate of lead, peat-moss, molasses, burdock-leaves, common salt, endive-leaves, lamp-black, gum, red dye, a black dye composed of vegetable red and liquorice, scraps of newspaper, cinnamon-stick, cabbage-leaves and straw brown paper."

HOW WE SQUANDER OUR VITAL RICHES.—The genius of our civilization in its physiological aspect is to make us spendthrifts of

all our vital riches. It includes no such aim as race improvement. True, some youthful culture of the head and heart is supposed to reach after that object. But it does not. It looks only to immediate success in social distinctions, or to winning in competitive struggles, not to the more remote objects of our improvement as a race. Indeed, the instances in which physical degeneration, by the prevailing injudicious and highly prized head-culture, is not thereby begun, are altogether exceptional. Compare the highly educated son with his father, and a perceptible diminution in the grade of constitutional stamina is nearly always manifest. Continue the process for a generation or two, and a progressive deterioration will ensue until there are only sickly boys to grow up into invalided manhood.

Very few ever think of, and yet fewer ever seek after, the accumulation of vital riches. Only when brought to suffering by poverty of this kind is the mind aroused to any interest in the subject. Prior to the inception of disease, a thoughtless squandering of vital reserve is what our social practices systematically encourage; and when as a debility, disease and untimely death ensue, these are not regarded as the evidences of a fatal flaw in the existing system of civilization, but as matters of prevision which alone concern Providence and the doctors. The constitutional vigor, thus so blindly spent, renders frequent demands upon the highest resources of the healing art urgently necessary. And it must be confessed that in prolonging the life of defective blood there are displayed a skill and care never before equaled.—[Dr. J. R. BLACK, *in Popular Science Monthly*.

A POWERFUL DISINFECTANT.—Chloride of lead is said to be the most powerful, safe and economical deodorizer and disinfectant known. To prepare it for use, on a small scale, for ordinary purposes, take half a drachm of the nitrate of lead and dissolve it in one pint of hot water; dissolve two drachms of common salt in two gallons of water and mix the solutions; this forms a solution of chloride of lead. A cloth wet with this, and hung up in a room filled with a fetid atmosphere, will sweeten it instantly; and the solution thrown into a water-closet, sink or drain, or wherever the sulphite of hydrogen and ammonium exists, or is generated, will

produce the same effect. It is not carbonic acid, but the sulphite of hydrogen and ammonium, which are eliminated with the breath, and through the pores of the skin, that makes people who are exposed to such an atmosphere so depressed, and which when highly concentrated develops typhus poison. Nitrate of lead is in dry crystals, and is sold according to quantity, at eighteen to twenty-five cents per pound, one of which would make several hundred gallons of the solution of chloride of lead. And if after testing, it proves to be as effective as represented, let it be published in every newspaper throughout the land.—[*Physician and Pharmacist.*

CONFLAGRATION FROM THE USE OF THE THERMO-CAUTERY DURING ANÆSTHESIA FROM ETHER.—The "British Medical Journal" (November 22, 1879), from a French source, gives an account of an operation under ether for arthritis of the knee-joint, in which the actual cautery was employed. Five ounces of ether had been employed. The window had been opened, the room was large, and the ether-bag was to a certain extent separated from the thermo-cautery. Suddenly the room was in flames, and the bed was enveloped in them. The ether-bag was thrown down on the floor and the patient quickly removed. She was only slightly burned, but the physician who was administering the ether was severely injured. Similar accidents have been noticed eleswhere. Ignition does not occur when the wire is only heated to redness; a white heat is necessary. Some years ago Dr. Dolbeau practiced local anæsthesia with ether-spray on the hæmorrhoids of a patient about to be operated upon. The apparatus having been removed, the red-hot iron was applied, but the ether vapor caught fire, and produced a general conflagration and extensive burning of the surrounding parts without affecting the hæmorrhoids.—[*Buffalo Med. and Surg. Jour.*

PROPOSED EXAMINATION IN OTOLOGY.—Professor Von Troeltsch, as we read in the "American Journal of Otology," has petitioned a commission appointed by the Chancellor of the German Empire on

medical reforms, to require all medical graduates to undergo an examination on otology. That a certain amount of knowledge on this subject is proper for every physician cannot be doubted; and we had supposed that amount was already required, especially in Germany. It is probable, however, that the learned professor would impose such an examination as would require a larger proportion of time and study than is compatible with the ordinary college curriculum. Other specialties would make the same claim, and we should have ophthalmology, dermatology, pharmacology, and even dentistry and other co-ordinate departments demanding recognition as essentials of graduation. Three or four years is not enough time to compass fully the present boundaries of medical education. With all the specialties superadded, students might think it equally reasonable for Professor Von Troeltsch to petition for the prolongation of human life to a hundred years or more, so that the graduate should have an opportunity to exercise and profit by his acquirement.—[*Pacific Medical and Surgical Journal.*

STRAIGHTENING HARDENED STEEL.—In hardening and tempering tools they sometimes spring, to the great annoyance of the workmen, and not seldom the tool is reheated and rehardened. In most cases this may be avoided. To straighten a piece of steel already heated and tempered, heat it lightly, not enough to draw the temper, and it may be straightened by blows from a hammer, if the character of the tool will admit of such treatment, or, as in case of a tap, it may be straightened by a heavy mallet on a hard wood block. Although the steel when cold would break like glass with this treatment, when slightly warmed it will yield to moderately heavy blows uninjured.—[*Scientific American.*

KOUMYSS is made as follows: Best unskimmed milk, one quart; yeast (brewers or old baker's), one hundred grams; cane sugar, two hundred grains. Mix and keep at a temperature of eight degrees F. until fermentation is brisk, stirring it frequently, then bottle, securing the cork with wire or cord.—[*Med. and Surg. Reporter.*

FOREIGN BODY in the œsophagus expelled by the hypodermic use of apomorphia. A child swallowed a prune-pit, that stuck fast in the œsophagus. M. Veiger reports that ipecac had been used without producing emesis; and as no proper instruments for the removal of a foreign body were at command, two subcutaneous injections of a solution of apomorphia, amounting in all to 1-27 grain of the drug, were given. Vomiting followed promptly, and the offending body was expelled.—[*Lyon Medical.*

WATERPROOF GLUE.—Glue may be made waterproof by adding a small quantity of solution of bichromate of potash and exposing to the light. Any soluble chromate may be substituted for the potassium salt with equally good results.—[*Druggist.*

THE HEART'S WORK.—Dr. Guyol, of Paris, after careful calculation, estimates that during sixty years of life the heart pulsates 2,259,800,000; during a life of eighty years, 3,007,040,000; in one hundred years there are 3,792,550,000 pulsations.—[*The Doctor.*

UREA.—"By some new experiments, Prof. Gamgee, of Manchester, has demonstrated that the liver is the principal, if not the only organ of the body concerned in the formation of Urea."—[*Detroit Lancet—Southern Practitioner.*

CORRESPONDENCE.

PETITION TO ESTABLISH A DENTAL DEPARTMENT IN THE IOWA STATE UNIVERSITY.

To the Honorable Senate and House of Representatives of the State of Iowa:

WHEREAS, The Iowa State University is established and supported by the people of Iowa to afford the facilities of education to those of our citizens whose successful pursuit of their vocations de-

pends largely upon mental discipline, and systematic and professional training; and

WHEREAS, Such facilities have been liberally granted to the Legal, Medical, Scientific, and other special pursuits, demanded by ou civilization and advancement; and

WHEREAS, The Dental Profession has grown to large numbers in the State, and has been obliged to send to Eastern cities and colleges, at great expense, to obtain their professional education, or enter upon their practice without any systematic and adequate education (as large numbers have).

We, therefore, citizens of the State of Iowa, do pray your Honorable body to make an appropriation of Three Thousand Dollars to enable the Board of Regents to establish a Dental Department in the Iowa State University.

FT. MADISON, IOWA, Dec. 16, 1879.

Why not petition the legislature at the same time for an appropriation to establish a blacksmith and carpenter shop, or a dressmaking establishment, to enable indigent young men and women to learn a trade at the expense of the public?

My *personal* interest is with this petition, but the people's interest is diametrically opposed to it; for why should they put me in a way to earn my living, or amass wealth at no expense to me, and leave members of other equally honorable and useful callings to work out their own salvation? I am opposed to this petition purely upon principle, which I esteem far above private considerations.

I am opposed to all sumptuary laws, or class legislation of every kind, and I would relegate to private enterprise, where they properly belong — dental schools, medical schools, law schools, and every other scheme for individual profit, at the expense of the public purse.

General education only should be at public expense, and made compulsory.

There are ample opportnnities for obtaining the most complete dental education, other than at public expense, to all who have the requisite energy of character; and unless they have this qualification I fear they would make but sorry dentists in any event. What we

need is young men of energy and ability to take advantage of the unbounded facilities for dental education we now possess in private institutions, instead of the public offering a reward, as it were, in the shape of free instruction to those who have not the ability or courage to possess it otherwise.

JNO. RIX, *Dentist.*

ILLINOIS STATE DENTAL SOCIETY.

The sixteenth annual meeting of the Illinois State Dental Society will be held at Bloomington on Tuesday, May 11th, and continue four days. Dentists from other States are cordially invited to be present.

EDMUND NOYES, *Secretary.*

OBITUARY.

At a called meeting of the Dentists, and the "Microscopic Society" of Memphis, Tennessee, the following resolution was passed unanimously:

Resolved, That we announce with great regret the death of Drs. S P. Cutler and J. C. Harris, of this city, and desire to record our testimony to their sterling worth as men and citizens, whose vast knowledge, ceaseless energies and probity of character were exponents of, and gave dignity to the dental profession; and to convey to their bereaved families the assurance of our most sincere condolence. J. L. NEWBORN, *Secretary.*

BOOK NOTICES.

A TREATISE ON ORAL DEFORMITIES AS A BRANCH OF MECHANICAL SURGERY. By Norman W. Kingsley, M. D. S., D. D. S. With over 350 Illustrations. D. Appleton & Co. New York.

Dr. Kingsley states, in his preface, that it is ten years since the work was begun; yet the time spent in its preparation is no more than proportionate to the arduous task he has successfully accomcomplished. The profession is under lasting obligations to the

author, for placing the result of his labors before them in so clear, definite and readable a shape.

The work is divided into five Parts, and each part into several Chapters.

Part I. treats of Irregularities of the teeth; including Etiology, Diagnosis, Mechanical Forces employed in their correction, &c., &c.

Part II., Palatine Defects, including Congenital and Acquired Cleft Palate, Obturators and other Appliances for the correction of Palatal Lesions, Buccal and Nasal Protheses, &c., &c.

Part III., Maxillary Fracture, comprising Location, Diagnosis, Splints, &c.

Part IV., Mechanism of Speech.

Part V., The Æsthetics of Dentistry.

It is impracticable, without quoting largely from the work itself, to give our readers any adequate idea of the great amount of labor that has been spent upon this work. The author not only sets forth his own views upon the various points treated in its pages, but he has also gleaned the field of medical literature and brought to his aid the views and opinions of other writers of note, so far as they serve in elucidating his subjects.

The prominence of Dr. Kingsley, as a writer on oral deformities, together with the prolonged study he has given to the subject, imparts a degree of authority to his opinions thereon, which is abundantly and deservedly recognized by the dental profession.

In discussing the etiology of irregularities of the teeth, he controverts the old and, among intelligent dentists, the generally abandoned notion that the premature extraction of the deciduous teeth causes a contraction of the jaw; yet he is compelled to recognize the importance of retaining certain of these teeth, with a view of preventing the migration of the permanent ones, and of thus securing space for the later comers, that they may not be crowded out of their normal positions in the dental arch.

The author emphasizes the fact that the proper "articulation of the masticatory organs is of much more importance than their number, and a limited number of grinding-teeth, fitting closely on occlusion, will be of far greater benefit to the individual than a mouthful of teeth with the articulation disturbed."

A whole chapter is given to the "Anatomy of Expression," and

it is to be hoped that the excellent hints therein contained will do something towards redeeming artificial dentistry from the mere mechanical condition it occupies at this time.

The book, in both text and illustration, deserves careful study by every one who aims at superiority.

OUR HOMES, by HENRY HARTSHORN, A. M., M. D., formerly Professor of Hygiene in the University of Pennsylvania, etc. Philadelphia, Presley Blakiston. St. Louis, H. R. Hildreth Printing Co. 50 cents.

The ninth, and one of the very best of the excellent series of Health primers, published by Mr. Blakiston. The design of the book is to popularize knowledge concerning the laws of hygiene as applied to the construction and occupancy of our dwellings; especially, those relating to the important matters of ventilation, drainage and water-supply. This little volume should be read and kept for reference by every house-keeper and builder in the land.

BOOKS AND PAMPHLETS RECEIVED.

VALEDICTORY ADDRESS OF THE CLASS OF THE JEFFERSON QUIZ ASSOCIATION, at the Philadelphia School of Anatomy and Surgery, March 10, 1880. By JOHN V. SHOEMAKER, A.M., M.D., member of the American Academy of Medicine.

This address comprises a history of the origin and growth of the Jefferson Quiz Association, together with a concise account of six years' experience in medical teaching.

ADDRESS DELIVERED AT THE COMMENCEMENT OF THE OHIO COLLEGE OF DENTAL SURGERY, Cincinnati, March, 6, 1880. By Dr. M. S. DEAN, of Chicago, Ill.

Unique, characteristic, excellent and original in Webster's 3rd sense.

EVOLUTION VERSUS SUPERNATURAL PHENOMENA. By J. HARDMAN, D. D. S. Read before the Academy of Science at Muscatine, Iowa, March 15, 1880.

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DENTAL REFORM.

The subject of "Dental Reform" in England, has been quite fully presented to our readers in the very able articles of "Our English Correspondent," which appeared in the January and February numbers of this journal for the current year. But in order that they may continue to be well informed relative to the progress which the new order of things is making in Great Britain, we transfer to our columns the annual address of the president of the Association of Surgeons practising Dental Surgery, which we clip from the "British Journal of Dental Science," and also the reply to that address in behalf of the British Dental Association, by Mr. John Tomes, of London. We take the letter of Mr. Tomes from the "Monthly Review of Dental Surgery," although it originally appeared in the "British Medical Journal."

The new Act of Parliament, known as the "Dentists Act," which went into operation on the 1st of August, 1879, has not been received with universal favor by the dentists of Great Britain, but has met with active and consciencious opposition from more than one source. The members and fellows of the Royal College of Sur-

geons, engaged in the practice of dentistry, as represented by the association which bears that name, are very earnest in their antagonism to the new law. The address of the president of that association sufficiently explains the position occupied by that body of educated dentists.

The American dentists residing in Great Britain oppose the law chiefly, or at all events largely, because it discriminates against the degrees granted by nearly all the Dental Colleges in the United States. They claim, and we think justly, that the American degree of Doctor of Dental Surgery (D. D. S.) is fully the equal of the English License to practice Dental Surgery (L. D. S.), and further that a question exists as to the practical evidence that the future quality of the L. D. S. degree will be in any considerable degree superior to that of the past.

That the educational acquirements requisite for obtaining the American degree are being steadily advanced, is evident to every one at all familiar with our system of education. This advance is being made as rapidly as circumstances will justify, and the sentiment of the profession in this country will sustain. Whether our English friends will outstrip us in the race for supremacy remains to be seen. Time alone will determine. The divided counsels that now seem to prevail on that side the Atlantic do not indicate such a result.

Mr. Tomes' reply touches only the point raised by President Cattlin, leaving the other features for (may we hope ?) a future communication.

ASSOCIATION OF SURGEONS PRACTISING DENTAL SURGERY.

BY W. A. N. CATTLIN, F. R. C. S.

[Presidential Address Delivered February 18th, 1880.]

Gentlemen:—Allow me to express the gratification it affords me to know that by the good-will of the Fellows of this Association I have been elected to preside over the only society of Dentists, which has been formed in this country, composed entirely of educa-

ted surgeons. I thank you for this honor, which is greatly increased by the fact that it has not been the custom for learned societies holding their meetings in London to select a president who resides, as I do, in the provinces. I congratulate the Association on the success of its first dinner. The cordial manner in which our views have been supported by the very heads of the medical profession is, to say the least, encouraging. Another point of congratulation is that a Fellow of this Society, and one practising our special branch of surgery, Mr. F. Brodie Imlach, now holds the office of President of the Royal College of Surgeons of Edinburgh. Mr. Hamilton Cartwright, in an interesting speech on the above occasion, drew an analogy between the barber-surgeons and the dentists of an early period, and spoke of them as distinct callings; but I shall endeavor to show that even surgery and dentistry were one science, and that they were practised together in the time of the poet Gay. In the fable of "The Goat without a Beard," he says, speaking of the goat,

> Resolv'd to smooth his shaggy face,
> He sought the barber of the place.
> A flippant monkey, spruce and smart,
> Hard by, profess'd the dapper art.
> His pole with pewter basins hung,
> Black, rotten teeth in order strung,
> Rang'd cups that in the window stood,
> Lin'd with red rags, to look like blood,
> Did well his threefold trade explain,
> Who shav'd, drew teeth and breath'd a vein.

Having traced the surgical branch of our noble profession to poor relation, I will leave Darwin to determine whether the artificial teeth worn by the ancients might not have been carved by some of our great great grandfathers. "Man is born to trouble as the sparks fly upwards." Some of you will sympathise with me when I tell you that, having very little leisure, I had worked hard to prepare an address embracing the modern history of dental reform, when the postman delivered a copy of the Transactions of the Odontological Society, with its President's address, in bold print, upon the self-same subject. I was consequently obliged hastily to prepare another, and must ask you to forgive its many faults. Without attributing "malice aforethought," I will refer you to the

address in question for much that is entertaining, both in facts and figures, although I shall venture to differ with him in some of his most cogent arguments. Keeping the same subject in view, and comparing our own branch with the parent tree, I shall endeavor to show you as we proceed that both medical and dental science have had their days of darkness, error and delay; and, indeed, if we may judge from recent discoveries, science, in its general sense, is only just expanding to the light of modern times.

The learned President of the Odontological Society is *perfectly* satisfied that the "coping stone" has been put upon dental reform, and that reduction, examination and legislation, as applied to dentistry, is now "THOROUGH!" He also considers that by the Dentists Act, dentistry, as a profession, is for the first time affiliated to the Royal College of Surgeons and its noble profession. If so, I am naturally tempted to ask how it happens that this promising child, if legitimate, is kept in a home of its own—the Dentists' Register—and not admitted into its father's mansion—the Medical Register?

The other night I had a dream, forgive me if I speak figuratively, when more than five thousand dentists thronged around my bed in different costumes. The large majority were busy, with their aprons on, screwing down little iron frames, just as the undertaker does his wooden box; others were cooking, in new-fashioned style, by gas and steam; others, again, were stamping gold and setting teeth upon it, ever and anon puffing and blowing like an engine-pipe; a few were dressed as gentlemen with a small mirror or a forceps in their hands, the latter with a spot of blood upon it. Some were polite and some were not, *but all by law were equal.* Some complained about the dirt and noise the others made, their want of scholarship, and altercation followed altercatiou until a fight arose, and, just as happened in the upper heavens, the wiser won, and drove the others out of their community.

> "Is this a dream?—then waking would be pain;
> Oh! do not wake me; let me dream again."

As medical politics still force themselves upon us, it may be amusing as well as instructive to confine our thoughts for a short time to the consideration of the early struggles which hindered the

development of some of the medical colleges. Should we be driven to found an institution of our own let us be forewarned that changes of great importance cannot suddenly be made; and, although we live in days of rapid progress, great undertakings will require the fostering hand of time to perfect them. The College of Physicians was at one time a very exclusive body; it is now a hall of courteous gentlemen. From being stiff and unyielding it has bent as readily to the spirit of the times as any other institution. One of the greatest obstructions with which the College of Surgeons had to contend in its early educational department was the repugnance of the public to be anatomised. So difficult was it even to obtain small portions of the human frame for dissection that thin bodies with thick heads would probably at that time have been worth most in a moribund condition. It is a little humiliating to be reminded of the time of a body-snatcher named Burke, who, with accomplices, actually suffocated people in the streets, and carried them when scarcely cold into the dissecting rooms. Parts of the human body were, moreover, hawked in various private surgeries, and the dead were raised from the graves, but not in the living state. So great has been the success of the anatomy act that every difficulty in this respect has been removed, and the public now live and die in peace, and have derived incalculable benefits from the better education of the medical students. Indeed, so great has been the change that the best subjects are now of little value, and perhaps before long a cremation company may be a profitable investment. There was a time, not many years ago, when the first surgeons of the day boasted of their ignorance of medicine; when most difficult operations were performed with the utmost skill, yet the risk of life was great during the after-treatment. Thanks to the knowledge of medicine possessed by such men as the late Sir Benjamin C. Brodie, and that model of British surgeons, Sir James Paget, this blot upon common sense has been removed. From the same cause it has fallen to my lot to witness much unnecessary suffering, wasted health, and even death, from ignorance in the practice of dental surgery. If we go back to the year 1815, when the apothecaries of England and Wales obtained their act of parliament, and began to remove the main obstruction to their progress, we shall perhaps find an example in them which we may im-

itate. At that time the majority kept open shops, and sold pink-saucers, smelling-bottles, besides drugs and chemicals, and were really more vendors of medicines than medical practitioners. According to Shakespeare, they were far from being a wealthy class. Feeling their degraded position (for the physician of that day scarcely condescended to consult with an apothecary), they set to work in right good earnest to improve themselves. The law not being retrospective, the more uneducated were allowed to remain in practice upon very slender evidence of their skill, until they were extinguished by effluxion of time. The better men, whilst using the powers of their new act to prevent empirical practice, instituted most creditable examinations, the severity of which was gradually increased until the apothecaries' license became one of the best, if not the best, test of medical knowledge. The public, as well as the medical mind, by slow degrees became convinced that medicine, in its broad sense, included surgery, and hence arose the superior class of general practitioners who now hold the double qualification. As education increased the custom of charging exclusively for medicine became distasteful, and, to meet a rising want in this respect, the druggists improved themselves, and have become the chief dispensers of medicines. It is indeed curious to note how gradually every improvement in the medical profession has taken place, and how certainly every requirement has been supplied. Let us hope that the same good fortune may happen to ourselves.

For some time past the great scheme advocated by the London University, of conducting one *thorough* examination as a test for medicine and surgery within one portal, has been growing into popularity, and the signs of the times plainly indicate that such a system is about to become the law. Thus far, since the year 1815, the object of the Legislature has been and now is, to consolidate the different classes of medical practitioners, and equalize medical education, and it is much to be lamented that the dentists act should have passed just at this crisis, as it is a strange contradiction of the whole scheme. With these examples before us, let us deliberately consider whether our own history differs materially from them. Like the apothecaries, we cannot boast of a high pedigree, and, like them, our advancement has been slow and gradual, but we have not yet progressed so far. The first grand effort in the shape

of progression was made about twenty-four years ago by the formation of the Odontological Society: it is almost impossible to estimate the amount of good by example and precept which that one society has done. Its last proceedings have, however, stultified its former acts. The dental hospital, the late college of dentists, the dental license, and our own association have all in their particular way contributed to the improvement which is evident and noticeable in our ranks. Show-cases, like the apothecaries' shops, will gradually disappear, advertisements are now less frequent and less vulgar, and I believe the amount of scientific knowledge which dental surgeons have contributed to the general stock of literature will bear favorable comparison with any other specialty

All was proceeding well with dentistry until the Dentists Act in 1878 fell like a withering storm and cut it from the parent tree. Looking earnestly at the present position of medical politics, and the wide difference of opinion which prevails among different grades of Dental practitioners, I am led to think that the hour of danger has arrived, and that this association will have an anxious duty to perform during the present session of Parliament. Hasty legislation has led to difficulties of a serious character. The Dentists' Register practically separates dentistry from surgery, and in my opinion is an error of the highest magnitude. Its blighting influence will be made apparent as time rolls on. It will scarcely be believed that, if a surgeon (who may or may not be a dental licentiate) declines upon principle to register his name in the Dental Register, he is by clauses XIX and XXVII of the Dentists Act deprived of the privilege of serving as an examiner upon the dental board of his own college, unless he sits, which is highly improbable, as one of its surgical members. Probably this flaw is an oversight, and will be altered as soon as the mistake be pointed out. Our sub-committees, appointed some time ago, will watch the progress of the medical amendment bill, and, if possible, prevent the abuse of medical titles. They will again urge the Legislature to forbid unqualified persons to use the title of "Surgeon" either alone or in conjunction with any other word or words. Still the question meets us at every turn, What further action ought this society to take under existing circumstances? Unless some effectual step is *quickly* taken dentists as a body will be isolated, and I fear be compelled to found a col-

lege of their own. In that case, by the constitution of fellows and members, some scheme might be arranged for the gradual separation of the surgical from the mechanical branch, thus imitating the old apothecaries by casting off the detrimental shop. It is to be regretted that out of 5,289 names which appear in the Dentists' Register only 533 have given positive evidence of either a medical or dental education. If the Dentists Act be allowed to remain unrepealed, what security is there that practitioners of other branches of surgery will not apply for and obtain a similar statute? If the Dentists Act be repealed—and I heartily hope it will be—then to prevent a repetition of the evil it has been suggested that when the proposed conjoint examining board is formed a candidate should notify that, in addition to the ordinary examination of a medical practitioner, he desires to be examined particularly as to his proficiency in dental, aural, occular, orthopædic or any other branch of surgery, and if he shall show a thorough knowledge of any such branch a certificate to that effect should be appended to his diploma, and he should be allowed to appear in the Medical Register as practicing that specialty. This certificate would not exclude him from general practice, because, being fully qualified in every respect, he would be entitled to practice one or every branch. In any and every case, those possessing the dental license should be encouraged to complete their surgical education, and for that purpose great facilities would be given to them during the next three years. They are the cream of the rising generation of dentists, their greeting is of future hope.

If a little learning is a dangerous thing, and if it be true of all professions that he who is only half educated can only be half trusted, then the dental licentiates will be most unwise if they remain in their present anomalous position. Finally, I should like to see established in this great metropolis consulting practitioners who, ripe with experience but not dim with age, would throw a halo of respectability around the whole profession. If they would arrange to meet their brethren in the surgeries, I believe they would frequently be consulted by them, as well as by members of the medical profession. During the progress of the dental practitioners bill I had an interview with its chief promoter, Mr. Tomes, a name worthily honored as a scientific dentist. I hope, like myself, he

was afflicted with mental color-blindness, and did not at that time see the mischievous tendencies of this bill. If otherwise, not even the glory of having received two public testimonials will save his high reputation from the blame of having inflicted a GREAT injury upon some of the best men in his own profession. My amiable rival, the president of the Odontological Society, pointing his remarks straight at this association, has thrown the gauntlet of defiance down by asserting that "they who had the power to carry the Dentists Act have also the power to maintain it." On behalf of this association I reply,

> "Thrice is he armed who has his quarrel just;
> And he but naked, though locked up in steel,
> Whose conscience by injustice is corrupted."

It does not quite accord with my ideas of brotherly fairness to indulge in terms of general complaint without delivering a bill of indictment, and if possible suggesting some remedy which might help to heal any of the sores from which Fellows of this Association are smarting. I will, therefore, in my individual capacity, say candidly what course I think it would be wise to pursue in order to repel the serious charge which may now be brought against dentists of being the first to sow the seed of discord, and of unnecessarily tearing a useful branch from the glorious old tree of medical science, and that, too, after its roots had been pruned, and just when its branches were about to be trimmed and gathered into harmonious unity by the conjoint scheme.

Those who have done this and assisted to do this can but make amends by retracing their steps. I would, therefore, suggest that the worst clauses of the Dentists Act should be repealed, and that only enough of it should remain to authorize dentists who were in practice prior to August 1st., 1879, and such others as are not yet ripe for medical registration. All qualified practitioners now on the Dental Register, I would carry as fast as I could to the Medical Register, and for the future adopt the scheme which has been suggested by my son, Mr. W. Cattlin, for the benefit of all specialists in any branch of either medicine or surgery. Should any of the "qualified" desire to remain on the Dental Register to die out by efflux-ion of time with the "unqualified," I would leave them alone in

their glory, and keep them warm under the very "coping stone" of reform of which my friendly rival is so proud, until the dream I mentioned to you is fully realized. It will, I am sure, be the pride of our Association to promote any good object, whether originated by ourselves or not; and especially to hold out the right hand of fellowship to those who, though differing with us in opinion on minor matters, may show a readiness to work with us for the general good. I thank you for the attentive manner in which you have listened to my remarks, which, on account of urgency, have been confined almost entirely to the politics of our profession. Even should the civil war which has begun last the whole of my presidency, rest assured that the scientific department of the Society shall not be neglected.

THE RELATIONS OF DENTISTRY TO SURGERY.

"SIR:—Mr. Cattlin, in the address which appeared in the "Journal" for March 6th, made use of my name in connection with the Dentists Act in a manner which leaves me but little choice as to a reply. I hope you will allow me, by the relation of facts, to rebut the charges which I think Mr. Cattlin would have hesitated to lay at my door, had he known all the circumstances attending the passing of the Dentists Act.

"I will first take the allegation of 'hasty legislation.' Prior to its introduction by Sir John Lubbock, a draft of the Dentists bill was sent (November 2d, 1877), to and approved by the Royal Colleges of Surgeons of England and of Ireland, and the Faculty of Physicians and Surgeons of Glasgow. The Royal College of Surgeons of Edinburgh approved the bill, subject to certain amendments, many of which were made; and the college has acted upon the powers given by the act. The bill was submitted in November, 1877, to the president and members of the Medical Council, which subsequently, in considering the dental sections of the Lord President's medical bill, recommended that certain clauses from the dental bill should take the place of one or other of the dental clauses of the government bill. On June 8th, 1878, the Parliamentary bills committee of the British Medical Association, after hear-

ing advocates for and against the bill, resolved 'that this committee approves the dental practitioners' bill as now amended.' Eleven hundred and fifty dental practitioners petitioned Parliament to pass the dentists bill. Included in the foregoing number were seventy qualified medical practitioners practicing dental surgery. Subsequently sixty-eight qualified surgeons or physicians practicing dental surgery memorialized individually the members of the House of Commons in support of the 'dental practitioners' bill, which has been considered with very great care,' etc. The bill, when in Parliament, was more than once printed in each of the dental journals. The views of a committee of the Association of Surgeons practicing dental surgery were not less extensively circulated. Surely, after this amount of consideration and subsequent approval by the surgical corporations and other medical bodies, and by the dentists themselves, the passing of the act eannot be justly described as the result of 'hasty legislation.'

"Then Mr. Cattlin says that 'the Dentists' Register separated dentistry from surgery.' Before the passing of the dentists act not one dental practitioner in five—or, as it would now appear, scarcely one in ten—had received any medical education or had any connection with the medical profession. Dentistry was an outlying and uncontrolled branch of general surgery. The dentists act places the dentist absolutely under the control of the medical authorities. His education, his examination and his registration, one and all, are governed by the General Medical Council and the surgical corporations; and if the conjoint scheme come into operation, it will, by the terms of the dentists' act, apply equally to the education of medical and of dental practitioners. Can anything be more strange than to say that this very close association is 'a separation of dentistry from surgery,' and in face, too, of the fact that the connection hitherto was voluntary and accepted by not one-fifth of the *bona-fide* practitioners?

"The next point urged by Mr. Cattlin is that a person should be a surgeon first and then a dentist. The paragraph in which this opinion is embodied is too long for verbal quotation. It may be put in other words—that the education of the dental surgeon shall exceed by two years the education of the general surgeon. For it has been conclusively shown that the medical and dental curricula

cannot rightly be included in the same four years. Almost all the dental practitioners who have been publicly engaged in teaching dental surgery, to the number of fifty (twenty-nine of whom held registrable medical qualifications), signed a memorial to the Medical Council declaring 'that, in our opinion, the requirements of the dental curriculum originated by the Royal College of Surgeons of England are not in any respect in excess of the educational necessities of the dental practitioner.' This curriculum, in its nature three-fifths medical and two-fifths dental or special, has been approved by the Medical Council and is adopted by the four surgical corporations which grant dental qualifications. It requires that of the four years to be devoted to professional studies two shall be given to dental hospital practice; practically, that the mornings of two years shall be devoted to one part of the required technical knowledge—the acquirement, under competent teachers, of manipulative skill in operating upon the teeth, &c., and it cannot be rightly contended by competent practitioners that less time will suffice. It is admitted on all hands that the four years allotted to medical education, if well employed, are not more than sufficient for the attainment of the knowledge requisite to competence; and if this time be not well employed, failure must be the result at the examination-table, even to the extent of a fourth, sometimes a third, of the candidates for diplomas. How, then, can another subject, which takes two years of special study for its acquirement, be thrust into the more than occupied four years of medical education? If it be thus thrust in, the general or the special education must be neglected; and to use the words of the President of Harvard University, when treating of the acquirement of a medical and a dental diploma within the same three years, 'one or other of the degrees is lowered to a deplorable extent.'

"Now, is it reasonable to require of the dental practitioner a higher degree of professional education than is required of the medical practitioner? Yet this condition would be enforced if the two qualifications are to be honestly gained. Would it be possible to enforce this unreasonable educational cost in time and money upon each of those who will be required to fill up the life-waste of the existing three or four thousand dental practitioners? Surely not. We have nothing to do with the exceptional few who are favored by

unusual talent or pecuniary resources. If too little be asked of them, they can distinguish themselves by adding more. The necessary medical and dental knowledge may be required of the rank and file, and the dental licentiateship provides this, concerning which qualification I may be allowed to quote from Professor Erichsen's admirable address on dental education, wherein he says ('British Journal of Dental Science,' August, 1879, p. 421), 'The examination which is required by the College of Surgeons embraces all those scientific and practical subjects which it is necessary for the dentist to know; and although many dentists go beyond this, and take the membership and even the fellowship of the College of Surgeons, I can scarcely look upon such an extension of professional study as being necessary to the great body of your profession. In fact, in order to obtain the membership of the College of Surgeons, it would be necessary for the dental student to acquire an amount of technical surgical knowledge which he knows will be useless, and which he intends to throw aside, and to forget as soon as he possibly can after he has obtained the diploma for which alone he has sought to acquire it. I think, therefore, that the L. D. S. diploma may be considered amply sufficient as a guarantee of the professional position and competence of any man who holds it.'

"In truth, the person licensed to practice dental surgery is and must ever be the dental surgeon; and if he add to his licentiateship a general qualification, he will be the surgeon and dentist. The one term indicates a special surgical education, the other a general surgical qualification to which a special qualification has been added. The distinction between the two titles is clear and sufficient. Bearing in mind that the question of title with a full knowledge of the subject has been twice considered and determined by the General Medical Council, once by the Parliamentary Bills Committee of the British Medical Association, by Parliament when the Dentists Bill was in Committee, and by the surgical corporations in the wording of their respective dental diplomas, I would ask, Is it, in the supposed interest of a limited number of persons, wise to prolong a struggle for the purpose of perverting the use of language to the extent of declaring that a person licensed to practice dental surgery is not, when in the practice of his calling, a dental surgeon? The many will not accept wrong at the hands of the few; and the ex-

penditure of energy in the cultivation of useless professional discord is greatly to be deplored.

"Mr. Cattlin's objection to registration seems by no means general, for a very large number of those dentists who hold medical qualifications appear in the columns of the Dentists' Register, sometimes associated with the words 'in practice with surgery, or medicine'; sometimes without this distinctive notification.

"I have no concern with Mr. Cattlin's dream born scheme of a new edition of dental reform. My purpose has been to show that the course pursued by the party with which I have acted, has been from first to last (throughout a period of over twenty years) consistent with common sense, common justice and the interest of the public; and that it has been actively supported by the great majority of those dental practitioners—with and without medical qualifications—who have taken any part for or against the consolidation of our calling into a recognized branch of the medical profession; furthermore, that, in preference to adopting any fanciful scheme of professional grandeur, a measure was attempted capable of being carried into effect. In the draft of our Bill, the lines of the Medical Act of 1858 were followed in respect to both education and registration, and amendments were introduced by the Government rendering the Dentists Act conformable with any future Medical Act. If, as alleged by Mr. Cattlin, harm has been done to some of my professional brethren by the course I have followed, the injury has certainly been self-inflicted, and is the inevitable consequence of their unwillingness to accept the ruling of competent and independent tribunals, and of the great majority of their fellow practitioners.

"I regret having occupied so much valuable space upon this time-worn and very thread-bare subject, but I could not, in justice to those I have represented, or to myself, remain silent under so grave an accusation as that preferred against me by my old friend, Mr. Cattlin. I remain, your obedient servant,

"JOHN TOMES.

"CATERHAM, March 9, 1880."

ALVEOLAR ABSCESS.

BY M. F. FINLEY, D. D. S.

[Read before the Michigan State Dental Association, 1879.]

Mr. President and Gentlemen:—I have chosen for a theme alveolar abscess. This has been, and no doubt will ever be, a source of great annoyance to the practitioner as well as to the patient; on account of the unwillingness of the patient to submit to a proper and systematic course of treatment, which oftentimes becomes odious unless he stops to consider the results of the disease if left to follow its course, as compared with the widely different issue of the case if properly and successfully managed. And also on account of the persistent course of treatment required in the majority of cases which present themselves; and the amount of suffering and inconvenience this disease causes the patient. It is also a great incentive to become proficient in the management of this disease, because of its difficulties and the bearing it has upon the comforts of humanity.

The proximate cause of alveolar abscess is destructive inflammation of the periosteum, or more explicitly, inflammation of the investing membrane of the tooth of sufficient duration and severity to result in checking life-action in the tissue. It then undergoes solution, and the nutrient material brought into the diseased territory is for the most part vitiated and is added to the accumulating debris.

This cause has its origin in others more remote, always occurring subsequent to, and in the vast majority of cases resulting from the death of the pulp. Also from dead and degenerating teeth, mechanical violence, as blows on the teeth, accidental or otherwise; the too rapid forcing of the teeth apart; sudden and extreme thermal changes; the presence of fillings forced through the root of a tooth; and in a great many cases where undue pressure is exerted upon an exposed pulp.

The course of the disease, from its incipient stages, I will try to describe in a brief form.

The presence of the irritating cause produces at first a slight de-

termination of blood to the part and an increased flow through the vessels, causing distension of the capillaries; reaction then takes place in these, resulting in stasis of blood, and exudation begins. But the irritating cause still exerting its influence, the increased flow of blood is kept up, producing a slight sense of fullness, which invites contact, and even pressure, from the opposing teeth, causing a rather pleasurable sensation and seeming relief.

As a consequence of the partial stasis and increased flow of blood, the surroundings precluding free expansion of the capillaries and other small vessels ramifying this membrane, these structures are pressed upon proportionally to the force of the determination of blood to the part.

This excessive pressure results in free exudation, and also in rupturing the overstrained capillaries, and the consequent outpouring of the various constituents of the blood.

Quite perceptible elongation of these teeth occur, becoming more apparent as the inflammatory process continues.

Also more or less swelling of the soft parts adjacent appears as a constant symptom. Excessive pain is experienced upon the application of pressure or percussion, and sometimes even the slightest touch is intolerable. There being a continuous, deep, dull and throbbing pain.

Structural changes are taking place and the quality of the blood is altered; suppuration is in progress.

What is termed the sac, and by some the pus-secreting sac, is formed from the vitiated blood, and is no more nor less than a mass of coagulated lymph.

The alveolus is absorbed from the undue pressure, and the structural changes which are occurring; formation of pus increases until an outlet is effected for its escape.

Quite a variation exists in the character of the discharge from alveolar abscess in different cases, and at different stages of the same case. Sometimes consisting of pure or laudable pus, but generally it presents less the character of pus and is a vitiated, ichorous fluid. It being modified by the systemic condition, by the tissue disintegrated, and by the character of the local irritants.

The size of the abscess cavity varies, owing to the severity of the disease and the peculiar susceptibility of the parts.

Sometimes the cavity enlarges after the pus has escaped, though generally it reaches its full size before that time.

The pus being left to force for itself an avenue of escape, the discharge occurs in various directions, and at variable distances from the point of secretion.

At times it occurs through the root, or between the tooth and alveolus, at other times directly through the alveolus and gum.

Occasionally the abscess is formed within the antrum, when the root of the tooth nearly or quite perforates the floor of that cavity and becomes complicated by involving its lining membrane. When this is the case the disease is difficult to treat, and frequently necessitates extraction of the offending member. Oftentimes the fistulous opening is at some considerable distance from the seat of the difficulty, though always following some natural avenue, which furnishes the least resistence to the outward progress of the pent-up matter.

Alveolar abscess is exceedingly variable in character, owing to the constitutional idiosyncrasy of the patient, the condition of the surrounding parts and the exciting cause.

Patients of a manifest inflammatory diathesis are much more subject to abscess, or those in whom there is considerable local inflammation from some local exciting cause.

Sometimes after the formation of an abscess, when there is a discharge of healthy pus, nature, unaided, may effect a cure; but in constitutions of a cachectic diathesis, the discharge is very apt to continue and is of a purulent, acrid character.

Often quite serious consequences follow neglect of these cases, as necrosis of the roots of teeth and portions of maxilla, and disease of the antrum; bad breath, dyspepsia, neuralgia and the like, being frequent concomitants of the disease.

Treatment.—Obtaining a minute history of the case, and making a thorough inspection, not only of the affected organ and its surroundings, but of the general appearance of the patient, and determining his constitutional peculiarities, will aid greatly in making a proper diagnosis and instituting a systematic course of treatment.

In cases of threatened abscess the indications are for removal of the cause of irritation and general antiphlogistic treatment.

When the abscess is of recent origin a cure can much more readily be effected than in one of long standing.

The first step in chronic, as in acute cases, will be to evacuate the pus cavity and the root canal of their contents, enlarging the latter to the apex of the root, and thoroughly cleanse these, applying disinfectants.

The object of the local treatment being to break up and destroy the accumulated lymph mass.

This is accomplished either by therapeutic or surgical means, or by the two combined.

If therapeutic treatment alone is employed, the agent to be used is introduced through the apex of the root to the seat of the disease. In order to break up an abscess by an operation, it must be easy of access, and scarcely ever can it be performed through the root.

But in the great majority of cases where the discharge is through the root, therapeutic treatment alone will suffice.

In accessible cases an opening can be made through the gum opposite the point of the root, either by stopping up the root and causing the pus to force an opening, or by making an incision with a sharp-pointed bistoury, and thus at once reaching the seat of the disease. When there is already an opening through the alveolus and gum, the canal should be sufficiently enlarged to admit of free use of the instrument in dissecting the lymph mass from the point of the root, removing it as completely as possible.

If the case is a favorable one, nature alone will restore the part to health. But generally therapeutic treatment will be required to assist in the work.

The agent to be used should be forced through the apex of the root, and, if possible, out at the opening in the gum. A pledget of cotton should be kept in the fistulous opening to allow of free drainage, and thus favor healing from the bottom. These applications should be repeated every day or two until the discharge ceases.

Abscess of the inferior maxilla is much more difficult to treat from a want of free egress for the secretion, and in many of these cases the removal of the tooth seems to be indicated.

And even in many cases of the upper maxilla, the most prompt and efficient treatment consists in the operation of replantation.

In performing this, the tooth should be carefully extracted to avoid injury to the tooth, fracture of the alveolus or laceration of the gums; then remove from the root or roots all the diseased periosteum and coagulated lymph; also the end of the root should be excised and rounded.

The cavity of decay, the pulp chamber and root canal should be thoroughly cleansed, formed and permanently filled. Upon the removal of the tooth a pledget of cotton should be placed in the socket, either moistened with some preparation to prevent, to a certain extent, coagulation of the blood, while working at the tooth; or allow the blood to coagulate in the socket and remove the cotton and coagulum just before replacing the tooth.

It now being ready for insertion, the socket is to be cleansed of the clots of blood, and all that does not properly belong there. Then carefully replace the tooth, allow the jaws to be closed which will carry it to its precise position, and apply stays or ligatures if necessary. Usually the tooth will become firmly attached in a few days.

DISCUSSION.

DR. HAUXHURST: Mr. President—The subject of alveolar abscess will probably always be a subject of interest to dentists. The treatment as given by the paper is very good indeed, and were I called upon to say a word in praise of it I should certainly do so. The subject is a large one; I shall speak only of the earlier stages of alveolar abscess, or those stages which precede the escape of the confined pus. In almost every case of alveolar abscess death of the pulp has taken place. If the pulp is there at all it is dead, and like any other organic matter, under similar conditions, namely, warmth and moisture, it soon passes into a putrefactive state. Certain gases result and by their own expansive force they pass from the foramen into the tissues lying about the apex of the teeth, where they become irritative and finally produce a certain inflammation which terminates in an abscess. They are diffused in various directions and in the end pass away in the blood. If no abscess should result before the organic constituents of the pulp have all been eliminated, there may not be any. In case the gaseous products of putrefaction of a

dead pulp are not fully absorbed and carried away as rapidly as formed, they accumulate in the vicinity of the apex of the teeth and give rise to irritation and pus. This is the pathology of abscess. There are two cases in which we may have alveolar abscess; in one there is a devitalized pulp confined in the canal, and there is an external fistula. In another case the abscess discharges through an open canal. Now, if in the former case we drill and find gas, we let it off, and immediately all the symptoms subside. The moment we perforate the pulp-chamber everything is quiet and the tooth begins to get better. But if the canal is impervious, the case becomes one of greater difficulty, and all the skill and knowledge of the physician must be called into requisition in order to relieve the patient. We are liable to meet with this condition and it is often difficult to give relief.

Suppose we have a tooth which has the pulp-canal filled. It is not possible to get at it easily and relieve, as we did when we drilled a canal which had not been filled. It is impossible to make a perforation and relieve in that way, and we know from all the symptoms that unless we do something very soon we shall have abscess. How to stop it? That is the question which every dentist has had put before him.

I shall make a suggestion or two in regard to the treatment of these cases. The first thing that I should do in such a case would be to determine whether the pus is yet formed. If not, very much may be done in various ways to arrest it. In the first place I should say, "give the tooth absolute rest," no irritation, no touching of the tooth, no feeling it to see if it is sore. Absolute rest is the first condition and one of great importance. Direct the patient not to touch this tooth or its opposite, never to test even to see if it is sore. Let it alone absolutely.

The next thing I should advise would be to give local counter-irritation; capsicum upon the gum I like better than chloroform. It seems to have a fine effect. Black pepper will do; hot water, as hot as can be borne, for a period of five or ten minutes, is a good thing. The effect is to draw away the blood from the part that is overloaded, there is less in the vessels and a tendency to improve in the abscess.

If there is constipation and the abscess is likely to go on, that

must be relieved, and while giving hot pedeluvia it is generally advisable to produce sweating; that draws the blood away from the inflamed parts. To give a cathartic is simply to continue this sweating process upon the mucous membrane, which is analogous to the skin, and is simply skin subject to new conditions of sunshine and warmth. You produce there a continuation of the effect you obtain by sweating, decreasing the amount of fluid in the system and lessening the blood-pressure. Thus you diminish the tendency to abscess.

With regard to medication, it is a good thing to give sulphate of quinia. Pus is formed from the withdrawal of certain elements from the blood, that is the white blood discs. These corpuscles penetrate the walls of the vessel and get out into the tissue. They do this by virtue of their ameboid movements. Once out of the vessel and in the tissue, this white blood corpuscle becomes a pus cell. Now, if you can arrest the power of movement in this cell, it cannot make its way out of the vessel, and pus will not form. This may be accomplished in part by quinia. This drug, therefore, discourages suppuration. If you have used all other agencies and still feel in doubt of success, you may give 15 or 20 grains of quinia in divided doses, so as to get it into the system as easily as possible and charge the blood with it. You may run the dose into twenty or twenty-five grains in particular cases. The effect is striking and most happy.

DR. DOUGLAS: Will Dr. Hauxhurst please explain how the gases are carried off in the blood?

DR. HAUXHURST: All gases are diffusible; they pass easily through the tissues; they are taken by the blood currents and are carried to other parts of the system, are expelled at the lungs and pass away. Gaseous matters are generally eliminated by way of the lungs, of course. They are diffusible through the system, going both ways constantly through animal membranes. They are passed through the skin, and when they are abundant they are eliminated through both skin and lungs.

DR. DOUGLAS: To make it a little plainer, I will say, the gas is not in appreciable quantities in the blood. It is absorbed by the blood as gases are absorbed by milk. Set milk in a room where there are strong odors, and after it has been there a few hours

and you taste that milk, you will perceive the prevailing odor of the room; if strong butter is there, it will have the rancid taste of the butter. Under certain conditions of the system gases are much more readily absorbed by the blood and pass away out of the system, as Dr. Hauxhurst says, through the lungs, than they are under other conditions. Sometimes we see a patient suffering from what is called wind-colic, which is in consequence of an excessive amount of gas within the intestines, and by giving certain remedies that gas is absorbed, and the suffering subsides in consequence of the absorption. Many times when we have threatened alveolar abscess from gas at the root of a tooth, giving certain remedies which promote the absorption of that gas will lessen the irritation. The absolute rest that Dr. Hauxhurst referred to is excellent, but by giving certain remedies the absorption of the gas is increased very much. Then the question arises, what is the remedy that will promote this absorption and thus tend largely to remove this irritation? Sometimes one remedy will do it and sometimes another. The local application of black pepper is good. I have used it. In many cases of ulceration of the mucous membrane of the mouth, black pepper given in attenuated form will cure promptly. I speak in favor of black pepper because I am more acquainted with the action of black pepper in this relation than with that of capsicum. I have not used the capsicum for this purpose nor for any form of stomatitis for many years, but I have used the black pepper, especially for canker of the mouth, and a few hours is sufficient sometimes to remove all the inflammation from those troublesome cankerous ulcers.

The opening of the root canal I also consider a very important item in the treatment of threatened alveolar abscess, or in the early stage of alveolar abscess. As Dr. Hauxhurst said, *sometimes* that is all the local treatment necessary, as when abscess is just commencing. I have also found the muriate of ammonia very excellent indeed; sometimes it requires but a very small quantity of this. I usually give my patients a small quantity of it in a paper and tell them to use a quarter of a grain or the bulk of a grain of wheat and put it opposite the root of the tooth and let it remain there.

There is occasionally a case in a scrofulous subject where tincture of iodine applied to the gums is excellent. Sometimes I am

greatly in question about whether it is necessary to use it as a local application or to use it in an attenuated form internally. I think it acts just as well in the latter way, but sometimes, where I have the impression that patients would hardly feel satisfied unless I make some strong local application, I use it as a local application. But in the majority of cases, where I use it at all, if I thought it would suit the patient as well, I would just as soon give it in the attenuated form.

These are the local remedies that I think are at least objectionable. By the use of mercurius vivus in small doses, many times the trouble can be entirely removed, the inflammation, swelling, sensitiveness and pain; and I have many a time filled the root-canal and the crown at the same sitting, where there was an alveolar abscess at the apex of the root, if the soreness was not too great. I have done this many a time without treating the abscess, because I could not open the root-canal, and then depended upon internal remedies for removing the entire difficulty, and not disappointed in it either. Another remedy is hepar sulphuris calcarium. In cases where the patient has been saturated with mercury—salivated—this will remove the difficulty equally as well as the mercurius vivus.

There is occasionally a case, but not very frequently, where belladonna or chamomilla vulgaris will have the same happy effect.

DR. SHATTUCK: I have used such remedies. I have also used chloroform. I should like to use it in the early stages of incipient abscess as well as to counteract the effect. I have used the leech in a great many cases with great success, in incipient abscess, attaching them to the gums to draw off the blood, and have been successful with that. But when the abscess is about to come to a head, and the face commences to inflame, what treatment would you follow then?

DR. DOUGLASS: Where it is about to come to a head, I do not know of any internal remedy that will act so efficiently as hepar sulphuris. Silicea will hasten it very much sometimes, but hepar is best. I do not know of any internal remedy that can be used with such efficiency as hepar sulphuris, to hasten suppuration.

DR. SHATTUCK: Would you poultice?

DR. DOUGLASS: Sometimes it is very important indeed, but *in*

the mouth I sometimes direct the patient to roast a fig, cut it and put the cut side next to the inflamed part, next to the swelling; that will hasten it very much. I do not know of anything more agreeable to use as a poultice than that. Poultices as a rule would not be very agreeable for patients to carry in the mouth. I should not poultice the outside of the face unless the abscess had come so near to the surface that I thought it was beyond question going to break on the outside, or would have to be lanced on the outside; because I think it has such a strong tendency to bring it to the surface of the face, which is always an unfortunate event.

DR. SHATTUCK: Suppose the face was badly swollen and painful, would you apply a poultice to relieve?

DR. DOUGLASS. No, I should apply water or arnicated water 1 to 10, to ease the pain and depend upon internal remedies to relieve the patient. The pain may almost always be relieved by giving belladonna in minute doses, or aconite, or mercurious viv. Sometimes by chamomilla—this is not the chamomile of the shops, but the chamomilla vulgaris, or German chamomilla. In one instance a colored man came to me with a tooth having alveolar abscess, and it had gone so far that I thought at that time—many years ago—that there was no stopping it. He wanted relief from the pain; he thought he could not have it extracted His wife wished me to give him something because he was so cross, and I gave him chamomilla vulgaris, one-tenth part of a drop of the tincture at a dose. The abscess was three days in coming to a head, and then broke, and one drop of that remedy every six to twelve hours relieved him entirely from the pain. I thought it was a good deal better than to let him suffer. His mouth was almost closed; he could not open it wide enough to put a goose-quill between the front teeth, and the chamomilla vulgaris relieved him entirely from the pain; by taking as above he slept well at night and worked by day.

DR. SHATTUCK: I had a case of abscess a short time ago, and it had got pretty well advanced before I saw it. The patient suffered considerably; the face was swollen badly; the eye was nearly shut. I applied fomentation of heated vinegar, which relieved him very much, and took down the swelling, finally it broke; I found the inflammation was very slow in subsiding, and there

was a little danger of erysipelas about the eye. I think the poisonous gas from the tooth had become infiltrated thoroughly through the tissues and to such an extent that the circulation could not carry it off; it was from a root that was supposed to have been filled, but I doubt very much whether it was filled solidly at the end, at the apex. It was a very severe case; I did not extract the tooth.

DR. DOUGLASS: I would say that the cases where there is the least danger of bringing an abscess to the external surface of the face by poulticing, would be the upper bicuspids, and next to those the upper incisors. With the cuspidati above and also the lower teeth, I think there is much more danger of bringing it to the external surface of the face. I do not know whether there is any of the teeth in front of the upper bicuspids, or any of the lower teeth, but what I have seen at some date, abscess break on the outside of the face. I think it is a very unfortunate thing when it does so, for it almost always leaves a bad scar. I have known two cases of the upper cuspidati ulcerating, and the abscess forming an opening a little below the internal corner of the eye.

DR. SHATTUCK: The patient I referred to objected to the poultice on account of the breaking on the outside; but I have used the poultice a great deal and have never seen it break on the outside. I would not use the poultice over a parotid gland. But in this case the symptoms indicated erysipelas more than anything else.

I would say, for the benefit of the younger members present, that hops are excellent sometimes to use as a poultice. They are not only very soothing, but sedative. You know that many times hops are used in pillows to sleep upon when people are nervous or sleepless, and they thus get better sleep; and many times in cases of erysipelas of the face or any other part of the body, hops will act excellently as a poultice.

DR JACKSON: We know at times that it is impossible, even though the amount of gas may be very small, for it to be carried off in the blood. In what condition is the blood at that time? Generally the system is in a depraved condition. The blood is in an impoverished condition; hence as the blood contains as much of these gases as it can carry, it is unable to take up more and

carry it off. Consequently, there is a constant irritation from pressure, and also irritation from a substance which is irritable of itself; and if you can give anything to cleanse the blood or to throw off these gases, whether by exciting perspiration or by withdrawing and relieving the pressure, that is what is required. Drawing the blood away from the part only relieves the pressure, but if you give substances to correct the blood, then you may have some hope of success. If you do not give something to cleanse the blood, these gases, or the decaying substances of the pulp, being almost always present, then you must expect alveolar abscess, and it will form in spite of you. As to the modes of treatment that have been given here, there are many that I have tried myself, some with very pleasant results, some with any thing but pleasant results, for, do all I could I could not prevent its going on to its full course. Black pepper is very good in certain cases, but in an advanced stage it has no effect. If, when it first commences to be sore, you roll up a little black pepper in a cloth and apply it, unless there is malaria in the system, it will generally stop it; but if there is malaria in the system (which is more frequently the case than many are willing to admit), it will have no effect whatever; it will not even relieve the pain. If there is malaria in the system I find that quinine is one of the best things that I can use to throw it off, together with a local application of tincture of iodine, or sometimes with a local application of tincture of aconite. Chloroform is good, but the relief from chloroform is very transient, unless you apply enough to take the skin off the part, produce counter-irritation and thus draw the blood from the deeper portions; then it may relieve it for a short time, but I never found a great deal of benefit from the use of chloroform or ether in these cases, only so far as the counter-irritation is concerned. Iodine has an effect beyond the simple local irritation, but chloroform has not. Iodine is an alterative, whereas chloroform may be in a measure alterative, but only when it takes the skin off the surface.

DR. TAFT: I desire to emphasize as well as I can the importance of studying conditions and being able to meet them. It is a very easy matter for us to detail cases, but the great point is to attain to a familiarity with conditions that may exist in any given case, and to know what is best to do as cases are presented. The course of

treatment will of course be modified by the phase of the case presented. There is a great deal of empirical treatment, and perhaps we are all more or less chargeable with it; we make some particular application in a case, simply hoping it will accomplish some good, without knowing its mode of action, or without knowing definitely what the condition is. If a severe case is presented and the patient has been suffering for twelve or twenty-four hours from a devitalized tooth with inflammation, it is an important question to decide whether there is suppuration or not; but a great many go to work without making an examination sufficient to determine whether there is suppuration or not, and perhaps treat for simple inflammation, or possibly treat a case of simple inflammation as they ought to treat a case after suppuration has taken place. Pus is sometimes formed without much swelling in the parts about it; in other instances there is extensive swelling without much suppuration, or with no suppuration at all. Sometimes there is a considerable amount of pus at the end of the root and very little swelling of the gum or the soft parts round about; these variations add to the difficulty of making a definite diagnosis. A case is presented which has perhaps been running a day or two, you must decide whether there is suppuration. If there is pus formed at the end of the root, the indication is simply for evacuation. The removal of the irritants, the cause of the trouble, is of course an important element in the treatment and must receive attention. The fluid, gas or vapor from decomposing pulp, or from any other source, must be removed or neutralized. When pus is formed evacuation is indicated in every case.

Occasionally in the incipient stages of suppuration an abscess may be aborted by systemic or local treatment, but these cases are exceptional, and it is only in constitutions of good recuperative power, where the nutritive function is well performed and the circulation freely carried on, that this course should be adopted. It is but seldom that abortive treatment ought to be resorted to. The ordinary course is the surgical method—evacuation and providing for discharge—removing the irritation of the pus, its pressure and poisonous influence, relieves the parts of their distension and their swelling, and ordinarily the case will make rapid recovery.

When there is an unfavorable systemic condition it should receive proper treatment. It would be cruel to a patient in such a condi-

tion to employ only heroic local treatment, that might only prolong the suffering perhaps indefinitely. In ordinary cases simply make an opening into the pus-cavity, evacuate it, wash it out, put a little lint in the opening you have made and let it remain; the pus is drawn out; the inflammation abates, the pain subsides very soon—immediately in many instances—and in a very short time the patient is comfortable, and suffers little or no pain, and all is well. The effort should be to aid nature in this matter.

The following case presented a few days ago in which a patient had been suffering for eighteen hours. There were indications that there was pus about the lateral incisor; there was not much swelling of the gums; the most swelling was in the lip and the soft parts outside; but from the indication given by the tooth, and the appearance of the parts, I inferred that pus was present. With a bistoury an opening was made through the gum and process to the end of the root, local anæsthesia was employed, and very little pain was experienced; the patient did not wince, though it was very sore and had been intensely painful; had kept him awake all night. A little pus escaped; introduced a little cotton saturated with the extract of witch-hazel, changed this two or three times in two days; with no other treatment than this, recovery was complete in a short time. Similar treatment is about all needed in a great many of these cases.

We should study the pathology, the sources of the difficulty; if we do this and are familiar with the modes of practice for treating alveolar abscess that are now known, there will be very little difficulty. It is being simplified every day, and this prolonged local treatment by counter irritants, &c., is rapidly going out of date. It is ordinarily possible to remove the cause in a few hours and relieve active alveolar abscess. Chronic abscess is another matter. I think there is a great deal of over-treatment in affections of this kind; prolonged treatment of days and weeks and sometimes months is wholly unnecessary, and cruel to patients; we should be able to accomplish work far better than that. I have reference more particularly to active abscess, and the permitting it to run on into a chronic condition, where it takes a month to cure and sometimes is never cured under the treatment employed. Every one should understand the mode of action of every agent he uses and be able to give a reason for his faith and practice.

DR. COWIE: I should like to ask how Prof. Taft determines the

proper place to put his lance in, in order to reach the place where the pus is forming; I have tried it and sometimes have failed in reaching it.

DR. TAFT: There are two or three things that will indicate something in that direction. It is not easy, in three-rooted teeth, to determine what root, if only one is affected; you can tell the direction of the root by the form and direction of the crown; you can estimate by the length of the crown the position and length of the root; the close observer will rarely fail. The pus is usually formed about the end of the root, put lance in so that it will reach that point. If the end of the root is resting in pus, percussion may not give pain; if there is no pus there, a blow will cause pain. There may be soreness at the side which will occasion pair; but if you strike at the end of it, not being shielded by this pus, there will be a sharper sensation, recognizable by the wincing of the patient. By these means it is possible to determine in almost every case whether pus is formed there and to what extent.

DR. CLELAND: I would like to ask another question. Suppose an abscess forms under the second lower molar; I think it is a much more difficult matter to put the knife in the position you desire there, particularly if there is any swelling; I have seen some cases where it is impossible to get the knife in.

DR. TAFT: I will simply answer that by saying, sometimes there is difficulty, there may be obstacles that cannot be surmounted, cases where it is not practicable to overcome the difficulties. But I have done this with the lower molars—they are the most difficult cases—I have sometimes run the knife down along the side of the roots, even where the process is very thick; then if I wish to go through I turn up the corners and take a small trephine and bore right through by two or three turns and make an opening.

DR. FIELD: At the palatine roots, where there is most difficulty with superior molars, do you make an opening through the palatine surface or not?

DR. TAFT: Take a thin-bladed, narrow bistoury and run right along the root; and you may then make an incision or cut the process down to the end of the root. In two or three cases I have gone through the process up inside in just the same way; I have gone through the gum below to reach the end of the root there; but ordinarily there is not much difficulty in getting in there.

DR. FIELD: Can not that be reached as well through the root itself, in the palatine root?

DR. TAFT: Sometimes it can, but there is this disadvantage in that; you do not get as free drainage for the pus that has accumulated at the end of the root; and another objection is, you get no depletion that way, while in the other blood is drawn from the part. The sea-tangle tent may be employed to great advantage in enlarging fistulous openings; they may be enlarged to any desirable extent by this means. Dr Thomas said to me a moment ago that he treats alveolar abscess almost exclusively by extraction and replanting. That is pre-eminently the method for chronic alveolar abscess. I have not been in the habit of doing it for active abscess—that is, in the forming stage aud while running through the rapid stages, but in a case of chronic abscess, where there has been a discharge for weeks or months, and the pus is formed there, take out the tooth, remove all diseased tissue and replace.

DR. DOUGLASS: I would like to make a few remarks in regard to ascertaining where to find the root of a tooth; Prof. Taft intimated that there was no difficulty. I do not think there is any difficulty in ordinary cases, but we have cases where there is an extreme length of the roots of the teeth, where they are not proportionate to the size or length of the crown. Sometimes we find them very short at the root, with large crowns. Others may have small, rather short crowns and extremely long roots. I have, in my valise, I think half a dozen or more teeth from one mouth where the crowns were small and the roots extremely long, and those which I have with me correspond to the rest of the teeth—they were from the mouth of a lady. She was a small, delicate person, and after I had extracted some four or five teeth for her, she thought I hurt her pretty badly, and was advised to go to a dentist, or a man who came as a dentist, to try him, for it was thought he would give less pain than I did. She went there and I think she had five crowns broken off, and she came to me and had the roots extracted. I have not met with another such case, with such small crowns and long roots.—[*Trans. Michigan State Dental Association.*

IRREGULARITIES OF THE TEETH AND THEIR SURGICAL TREATMENT.

[Summary of paper read by Mr. Francis Fox before the Association of Surgeons Practicing Dental Surgery, March 17, 1880.]

The early decay of teeth which marks the present generation is due, the author thought, to malnutrition occurring in the earlier periods of life. At about seven months after birth a process of absorption is set up in the walls of the crypt and parts superimposed, and by this process the crowns of the temporary teeth become visible above the surface of the gums.

When the crowns of the teeth have erupted this absorptive action for a time ceases, and a renewal of the developmental process ensues, by which the alveoli are built up around the roots of the teeth. At about four years of age the temporary dentition is perfected, and soon after this perfection is reached absorption again sets in, commencing now in the roots of the teeth, and these, together with their alveolar processes, are gradually removed, their permanent successors replacing them by a similar process of absorption of crypt and development of alveolar structures. The important point to bear in mind is the fact that the alveolar portion of the jaws is developed with each dentition, so that a previous alveolar structure can have little to do with the position of the succeeding teeth, except as it may present an obstacle to their onward progress in consequence of its non-absorption. As to the development of the jaw-bones, Mr. Fox remarked that these bones consist of two portions, (1) an alveolar structure, developed with the temporary teeth, absorbed with them, and again redeveloped with the permanent teeth, and (2) a basal portion. This base is more prominently marked in the lower jaw, in which the inferior dental canal very emphatically indicates the junction between the two portions of the bone. The base of the jaw when once formed remains in pretty much the same condition throughout life, except in advanced old age when the muscles of mastication are no longer in full use, and then in a slight degree it becomes wasted.

In the superior maxillæ at birth the alveolar processes descend but little below the level of the palatal plates, and the anterior and

posterior parts are but little developed. As age advances the alveoli lengthen, the tuberosities increase in size, and an active development of bone takes place in these situations. The tuberosities are to the upper maxillæ what the coronoid processes are to the lower jaw. From these points the alveolar line is lengthened. In the lower jaw an alteration in the position of its articular surfaces and ascending rami, together with an absorption of the coronoid processes, accompanies the development of the posterior permanent teeth. The jaw elongates by additions to its posterior cornua. The capacity of the jaws in childhood is nearly equal to the anterior portions of the adult bones; for the ten anterior teeth or the permanent set in each jaw replace the temporary and occupy the same position as these, so that this part of the jaw in adult life is pretty much the same as in childhood. If contracted then it will remain so throughout life, and no subsequent development in the posterior regions will tend to expand it. The replacement of the temporary teeth by their successors is effected by a purely physiological process, and is absolutely independent of pressure. There seems to be a physiological law by which the cells composing the absorbent papilla in the neighborhood of a developing tissue have the power of absorbing a mature structure. That pressure has nothing to do with the process may be proved by the fact that, in cases in which the shedding of the first teeth has taken place prematurely, a layer of bone has often been observed to intervene between the crown of the advancing tooth and the base of the socket of its predecessor. At the time when the temporary teeth are about to be shed, in the well developed jaw, a decided separation between contiguous teeth is noticeable; and this circumstance is a fair indication of a future regularity in the succeeding dentition, and a proof that this portion of the jaw has already been prepared to receive the larger permanent teeth. If the process of absorption continues uninterruptedly, the roots of the temporary teeth will be gradually removed, leaving little more than the shells of the crowns, which readily drop from the gum as their successors are in turn ready to occupy their places. But should any arrest in this process occur (and such is far from an uncommon circumstance), these temporary organs are liable to offer very considerable obstacles to the regular advance of their permanent successors. The causes of irregularity in the position of the

teeth may arise during the developmental periods of life, and are then due to a want of proportion in the size of the teeth and jaws, or to a faulty development of the jaw-bones; or the displacement may depend upon some accidental circumstances arising subsequently, such as the prolonged retention of the temporary teeth, the presen e of supernumerary teeth, the habit of "thumb-sucking," or the undue pressure from an hypertrophied tongue. There is abundant evidence to prove how frequently such deformity depends upon hereditary influences. The conditions of life to which our race has for so many generations been subjected, seem to have lessened the necessity for the broad and well formed jaws which were so characteristic of o ir ancestors, and for many years the advances in civilization have been marked by a deterioration in the capacity of our jaw-bones. Mr. Coleman, in some interesting investigations made several years ago, found that the percentage of contracted jaws was immeasurably greater in the children of the well-bred population than in those of less refined cultivation. The prolonged retention of temporary teeth is frequently associated with irregularity in their successors, and is probably often the cause of such irregularity. The presence of supernumerary teeth in the dental arch may prevent the normal members from assuming their proper places; but doubtless a disproportion of size between the teeth and jaws is of all causes of irregularity the most common. This disparity leads to a crowding of the teeth, sometimes to such an extent as to altogether prevent the eruption of some one or more of the dental series, such remaining impacted in the substance of the jaws. Certain injuries in early life may occasion displacement of the teeth, especially in the lower maxilla, such as the contraction of cicatrices about the face and neck. Mr. Salter, in his work on Dental Pathology and Surgery, treats the subject of irregularity of the teeth under two heads—(*a*) simple irregularity in which the misplacement is confined to one jaw, and is independent of the position of the teeth in the opposite jaw; (*b*) compound irregularity, which depends upon the position of the teeth in the opposing jaw. In "simple irregularity"—that is, where the misplacement is confined to one jaw, the crown only of the tooth may be irregularly placed, the apex of the root retaining its normal position; or the entire tooth may be displaced, or faulty in its development. Such irregular teeth are often

entirely removed from the dental arch, and may be impacted in the substance of the jaw-bones. In the former condition, when the apex of the root retains its normal position, much good may be effected by judicious treatment, but in the latter case little can be be done to remedy the evil, except by the removal of the displaced tooth.

As examples of "simple irregularity," we may mention the appearance of the upper canines above the alveolar ridge, or in the palate, owing to insufficient room for them in the dental arch. An early loss of their temporary predecessors, by permitting the first bicuspid and the lateral incisor to approach each other, is not infrequently the immediate cause of this displacement. Sometimes, however, the retention of the temporary canine, or the presence of a supernumerary tooth, will occasion its deformity. An overlapping of the incisors is another form of "simple irregularity," and frequently requires for its treatment a resort to some mechanical appliance in order to obtain regularity in the position of these teeth. Another not uncommon form of irregularity is where an incisor tooth is more or less twisted, sometimes to such a degree that the side of the crown will occupy the position of its anterior surface. A forcible twisting of the tooth into its right position is very generally adopted. Some, however, are adverse to this prompt treatment, and suggest the employment of a plate carefully adjusted to the palate, and having certain properly constructed points of resistance. An unsightly separation of the central incisors in the upper jaw sometimes occurs, and the teeth may be readily drawn together, but have a great tendency to return to their former position. In treating these cases great care should be taken to prevent the ligature from slipping below the edge of the gum—between the necks of the teeth and the gum—for the irritation set up by such a mishap has been known to cause the death of the tooth. In order to prevent this displacement of the ligature, a small vulcanite plate may be constructed to which the ligature can be attached, and thus prevented from shifting its position. The second form of irregularity of the teeth—that depending upon the position of the teeth in the opposing jaw—is much more complicated. As an example might be cited the "underhung jaw," in which the "bite" is intersecting; some or all of the six front upper teeth being shut behind the correspond-

ing teeth in the lower jaw. This condition, in its extreme extent, arises from an undue development of the lower over the upper jaw, or from a want of development in the superior maxillary bones. It may also arise from a retardation in the eruption of the superior incisors, or by these teeth being pushed inwards by the prolonged occupation of the dental arch by their temporary predecessors. An early treatment of this irregularity is all-important, and should consist in preventing the contact of the opposing teeth. An opposite condition of the lower jaw sometimes occurs, in which the lower incisor teeth bite close up to the palate, so that they press against the necks of the upper teeth, and push them forward. A separation of the teeth in the anterior portions of the jaws has been described, and is occasioned by a congenital malformation of the lower jaw. The early obliquity in the position of the ascending rami is unduly maintained, and there is a want of development in the alveolar portions of the jaws, especially in the regions of the molar teeth. This irregularity may be caused by the contraction of a cicatrix in the throat or neck. The bicuspid teeth are not infrequently misplaced, and, when so, they usually occupy a too inward position. This may arise solely from their having been prevented from assuming their proper position in the dental arch by the prolonged retention of the temporary molars. But usually it is dependent upon a diminished capacity of the jaw, and in the upper jaw is generally associated with a projection of the incisors, and a more or less elevation of the palate constituting the V-shaped jaw, or "rabbit-mouth." This malformation is congenital, but, except in very exaggerated cases, is not very manifest until the posterior permanent teeth are about to be erupted, when the additions to the superior maxilla have been made in the posterior regions. The newly formed bone, which has been gradually developing, is now found to be placed at an angle with the pre-existing alveolar line. This abnormal development has arisen in order to effect an harmonious arrangement with the other bones of the cranium. The maxillary bones having been imperfectly developed during early childhood, their posterior borders not being sufficiently divergent, the subsequent additions for adult conformation are placed in a wider circle; hence the point of junction between the two parts (the old and the new, so to speak) is marked by an angle of more or less extent. It is usually associated with great delicacy of con-

stitution, and may occur in those of weak mental powers, but is often observed in persons of great intellectual capacity. The treatment of these cases consists in endeavoring to gain increased space in the dental arch, and to diminish the projection of the upper front teeth; but is, as a rule, more or less unsatisfactory. Irregularity in the wisdom teeth is sometimes met with, and may occasion most serious mischief, when extraction is the remedy. Transposition of the teeth is rare, and is usually met with anteriorly; and also inversion, which is still rarer.

A discussion ensued, in which the President, Mr. E. Bartlett, Mr. Gaine, Mr. Parson and others took part.—[*London Lancet.*

METALLIC MERCURY FOUND IN THE URINE FOLLOWING THE ADMINSTRATION OF THE GREEN IODIDE.

By PLYM. S. HAYES, M.D., Prof. Chemistry, Woman's Medical College, Chicago.

[Read before the Chicago Biographical Society April, 1880.]

Mr. B——, a commercial traveler, aged thirty, of German parentage, of full habit and light complexion, placed himself under my care a short time since.

He stated that he was suffering from syphilis, recently acquired, and was then suffering from a severe headache and sore throat. Although he had taken a severe cold just before leaving New York, he was fearful that his present troubles were manifestations of syphilis. His skin was hot and dry, and his pulse 110 per minute. His throat was of a damask hue, but without any patches or ulceration. There was a nearly healed chancre on his prepuce; this had been cauterized by his New York physician. He had two (now suppurating) buboes, and the syphilides were just appearing on his forehead. He stated that the following prescription was all the medicine he had taken since he had become syphilitic:

℞

Hydrargyri iodidi virid, - - - - - gr. x.
Ext. opii, - - - - - - - - gr. v.

M. et fiat pil. No. 20.

S. Take one three times a day.

I advised that he continue the pills, and in addition gave him quinine as a gargle. Two days later he came to my office, and I applied a dilute solution of the liq. hydrargyri nitratis to the eruption. In all not more than three drops of the liq. hydrargyri nitratis were used. The next day he returned, with the left side of his face quite swollen. Two days later he sent for me and I found his legs quite œdematous, the pulse and temperature remaining the same as when I first saw him. The urine was small in quantity and high-colored. An examination of it revealed the following: The specific gravity was 1,035; albumen was present in such quantity that when coagulated the coagulum formed a cast of the test tube. A microscopical examination revealed a large number of waxy casts with a few oil globules, and a few free blood globules and epithelial cells. The mercury was discontinued and the patient ordered a hot bath, which was to be followed by the fld. ext. jaborandi, fifteen minims every half hour until diaphoresis ensued. Two days later another specimen of urine was obtained. The specific gravity of this was 1,021, and there was no albumen. The casts, oil globules and blood globules had disappeared. Five slides were examined under the microscope. In three of the five, globules of mercury were found, varying in size from the 1-3,000 to the 1-500 of an inch. Dr. H. M. Bannister examined two of the slides and confirmed the above statement. It did not occur to me to examine the first specimen for mercury. A week later the dropsy had disappeared and the eruption had vanished.

Mr. B——— stated that five or six years ago he had been treated with mercury—in what form he was unable to say—for syphilis. The only symptom of syphilis he had at that time was the sore on the penis. At that time the mercury was given until he was salivated, and then discontinued; since which time he has not taken any until the present inoculation. Whether the albumenuria was due to the mercury, to the cold he had taken, or to both, I am unable to say. From the rapid subsidence of the œdema, and the more rapid disappearance of the albumen from the urine after the mercury had been discontinued, I am of the opinion that mercury was the chief factor in the case. The bottle in which the last specimen of urine was obtained was absolutely clean, having been bought new at the druggists's. The patient urinated directly into the bottle.

And finally, the slides and covers used in examining the last four specimens had never been used before. Every precaution was used to exclude errors. I was induced to look for metallic mercury, from Dr. Clevenger's paper on "The Action of Mercury." The important fact in this case is the appearance of metallic mercury in the urine following the ingestion of the green iodide, the patient not having taken mercury for five years before, and then probably as a salt and not in the metallic form.—[*Chicago Medical Gazette.*

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

JANUARY, 1880.—INCIDENTS OF PRACTICE.

DR. ESSIG described the audophone as made at present, and thought it could be improved upon by having a diaphragm attached, and something for the teeth to grasp.

DR. JACK related an anecdote of a deaf gentleman who heard the conversation of two friends by placing one end of a key against a column in the room, and the other end between his teeth. The labyrinth of the ear and its nerves were in a normal condition. He thought an audiphone made of thin metal would be more sensitive to impressions than one made of hard rubber. He referred to the importance of the mouth in the conveyance of sound, since in listening to faint sounds it is kept open.

DR. DIXON: I would like to call attention to tin-foil as a material for permanent fillings. I have used it of late much more than formerly, having had my attention drawn to it particularly by finding teeth filled with it in 1876 by the late Dr. DeMorat. First-class gold-fillings in the same mouths, made at the same time by the same hand, had needed repeated repairs, without which the teeth would have been lost. Tin-foil, as now prepared, is very soft and plastic, and easily made into excellent fillings. I conscientiously bring the matter before the society, believing that very frail teeth can be better saved by tin than by gold-fillings in many cases, probably owing to its lower conductive power. Besides, I do not remember having ever met with a devitalized pulp under a tin-filling where devitalization had not taken place prior to its insertion. I also think

that fillings well made of the tin as now prepared last much longer on the grinding surfaces than they did years ago.

DR. JACK. I have found shredded tin unsatisfactory, as the particles do not become united, and are too small to exert any binding force upon each other.

DR. DARBY: In approximal cavities, which do not extend to the masticating surface, tin is as good, if not superior to gold, as a material for filling. It does not discolor tooth-structure like amalgam.

DR. JACK: The excellent preservative properties of tin are due principally, I believe, to its softness and pliability, which render it not difficult to adapt to the surface of the cavity without the employment of much force. This, it seems to my mind, accounts for its superiority over gold in very soft teeth. I have had opportunity to know that the force requisite to solidly pack and condense gold is frequently injurious to the enamel borders of cavities. This is more particularly the case where ordinary mallets are employed in filling teeth, because, if the first gold against the cervical wall is packed to a proper degree of solidity, every subsequent blow of the mallet extends its force to the last layer. The repetition of blows may often be damaging to enamel borders of imperfectly calcified enamel, which would have no perceptible effect upon sound and flinty enamel. I have even observed injury inflicted upon the margin of cavities by hand-pressure, when I have had reason to believe the instrument had not been in contact with the tooth. Tin has also the further advantage of being an indifferent conductor of heat.

DR. D. NEALL: I used tin largely thirty-five years ago, but subsequently preferred gold, as then it was quite as adaptable as tin, and not so subject to waste as the latter upon the grinding surfaces. I have used it somewhat lately, and hold it to be a metal less incongruous with tooth-substance than gold. I put in a tin-filling in 1843. I had watched it for thirty years. At the end of this period it had worn away considerably, but the margins of the cavity did not decay. I put in a cap of gold-foil upon it, and both fillings remain sound and secure to this day. I think we must admit that experience demonstrates that tin is kindlier in its union with tooth-substance than many of the gold-foils of the present day.

DR. E. H. NEALL: In certain cases, where the teeth show a low degree of calcification, as well as in the mouths of young children, I

think tin-foil an excellent filling material, as it can be easily and quickly packed and quite as readily trimmed down flush with the margin of the cavity; indeed, very often the plug can be consolidated and nicely finished with a strong burnisher, so that the corundum disk need not be used, thereby sparing the enamel borders from the least abrasion. Some eight years ago I used a great deal of tin in the mouths of children; many of these fillings I have seen from time to time, and, with the exception of being worn down by mastication, they are in excellent condition, thoroughly preserving the teeth, and also without discoloration noticeable around amalgam fillings. The tin-foil supplied the profession at present I think of superior quality.

AMBLER TEES, D. D. S., A. M., *Recording Secretary.*

—[*Dental Cosmos.*

JOURNALISTIC.

[Under this head it is our purpose to present the readers of the MISSOURI DENTAL JOURNAL with a brief review of the articles of chief interest met with in our exchanges, together with such comments, suggestions and references as will serve to elucidate the subject to which they respectively relate.—L.]

The "Dental Register" for February opens with a selection from the transactions of the California State Dental Association. It is by Dr. A. F. McLain, and treats of Cancroid Stomatitis, or, as generally known and described, *Aphthæ.* The several forms of the disease are touched upon, but particularly the form "more peculiar to adults," and which "may occur on the gums, tongue and internal parts of the lips or cheeks.." He regards the disease as "being the same, and arising from the same causes, as that belonging to infancy." His treatment for the simplest cases is the local application of aromatic sulphuric acid.

A stubborn case is described, which yielded at one time to constitutional treatment with iodide of potassium, at another with quinine and iron. On both occasions local treatment was also resorted to. The primary cause of the trouble is said to be "a depraved condition of the system," brought on by bad and insufficient nourishment, impure air, want of cleanliness, etc.

We would suggest, as a common cause of some of the forms of this affection in people of sedentary habits, such articles of food as pie-crust, certain kinds of crackers, hot buttered toast, etc. Any article of food which has had fat of whatever kind *fried into it* will, in the class just mentioned, develop not only a diseased condition of the mucous surfaces of the mouth, but also a diseased condition, —a pimple-like eruption—of the skin, particularly on the breast, lips and wings of the nose. This eruption is suggestive of the condition of the mouth, the cause of the trouble, and the treatment necessary to effect a cure. The local treatment of the simpler forms of apthæ consists in touching the parts with carbolic acid, and using a weak solution of the same as a wash.

Dr P. B. Spalding writes, with some show of prejudice, on "Tobacco." He uses such expressions as "den of deadliest poisons," "repository of deadliest poisons," "unmixed evil and rapidly ruinous." Notwithstanding the truth of many of the author's statements, tobacco will continue to fill a large place in the affections of most men, much to the chagrin of those who have yet to experience a little of that peace that passeth understanding and cometh of a good cigar. The next three articles, which treat of chemistry, ethics and education, go over ground that has been trodden to death, and yet it is this frequent repetition of facts and theories that fixes them in the mind.

Dr. E. D. Swain says a good word for mechanical dentistry, and gives in detail the Richmond and Hall methods of constructing and setting gold crowns or shells on the roots of bicuspid and molar teeth.

In the March number of this same journal Dr. C. M. Wright says, "It is often well to prepare and fill the roots, dress them carefully with the corundum wheels of the engine, and apply dental plates supporting artificial teeth over them." To this we subscribe in a *very few* cases, but we believe it to be bad practice, as a rule, to leave a root under a plate. Sooner or later that root will give trouble, and its removal may necessitate a new plate. While it remains it can hardly fail to give rise to an unpleasant taste, not so much, however, from a diseased condition of the root itself, as from the fluids and food working their way into and filling the cavity that must exist in its immediate vicinity. Roots may be left where

pivoting is to be done, where their removal would permit other teeth to approach each other, thus destroying the articulation, and finally where their removal would lead to a translation or shifting of diseased conditions.

Dr. A. W. Harlan has a short paper on "Extraction of First Molars." Where extraction must for various reasons be resorted to, he makes it a rule to extract not later than four years after the eruption of the tooth. A very good rule. L.

MISCELLANY.

A NEW FIELD FOR PHYSICIANS.—In commenting upon a paper which recently appeared in a Western journal on the differentiation of diphtheria from all other diseases with which it is now confounded, by means of the sense of smell alone, the "Medical and Surgical Reporter" calls attention to the articles of Robin, Hammond and Hutton on the same subject, and concludes by regretting that this organ has received so little cultivation among physicians. "It is but casually called into service; and even the most ordinary rules of its use are disregarded. How many people pretend to test odors, and keep their mouth open, talking, while they do it! How many distinguish between the properties of odors developed by long and slow inhalations, and short and rapid sniffs! And other such elementary matters.

"Finally, has any endeavor been made to increase our olfactory powers? We have the microscope for the eye, the stethoscope for the ear, but what have we to exaggerate the normal force of odor? Here is a field for invention, and a successful suggestion would not only enlarge our powers of observation, and thus add to scientific knowledge, but also largely augment the innocent pleasures of life." —[*Lancet and Clinic.*

THE APPLICATION OF COLD AND THE ELEVATION OF AN EXTREMITY AS HÆMOSTATICS.—It appears from recent researches, that as a prophylactic against hemorrhage, Esmarch's bandage does not answer all the requirements demanded of it by over-exact-

ing critics, who have found it necessary to unearth and resuscitate antiquated practices, to serve as happy illustrations of the practical application of results experimentally obtained. In this regard the recent (?) researches of Dr. Wolf ("Centralbl. fur. Chir." No. 35) strikingly resemble those demonstrated by Prof. Lister to the French Academy. Careful thermometric measurements have shown that the simple elevation of an extremity will be followed by a reduction of its temperature amounting to six or seven degrees. If in addition a moderate degree of cold be applied to the surface, "a contraction of the capillaries will ensue which may continue during several hours, the member all the while remaining pale and cold."

In attempting to utilize these results, which failed to impress us as original or even novel, Dr. Wolff employed in a number of operations on extremities the prolonged application of cold to the elevated limb and succeeded admirably. The procedure consists in freezing the part during from fifteen to thirty minutes before the operation by irrigation with cold water. During the operation the extremity should be held in a vertical position. By this means the loss of blood is surprisingly diminished, little operations being absolutely bloodless, and greater ones minus the danger of secondary hemorrhage, so frequent after constriction by Esmarch's bandage. The method under consideration has been applied in ten operations, and generally with success. In a patient aged ten years Bardeleben performed Sime's amputation with but an insignificant hemorrhage. It is necessary to add, however, that the process of refrigeration was commenced several hours before the operation, and that during the latter the femoral artery was compressed.—[*Lancet and Clinic.*

THE DENTAL PROFESSION IN FRANCE.—We are glad to see that at last there seems a fair prospect of an improvement in the dental branch of the profession in France. It has long been a matter of wonder why, in a country where the education and status of the medical profession generally leave little of serious importance to be desired, dentistry has always been ignored by medical authorities, and has been relegated by common consent into the hands of charlatans. The number of dentists in France holding a diploma indi-

cating professional education is extremely small, and this number is mainly composed of foreigners—Englishmen and Americans. We also believe that there is no school of dentistry. in France, and lectures or instruction on the subject are, as a rule, not provided at the medical schools or hospitals. Thanks to the efforts, in the first place, of Dr. Mordaunt Stevens, of Paris, an old student of the Dental Hospital of London, this deplorable state of things appears likely now to undergo a change for the better. A society has been formed, styed "La Société Syndical des Dentistes," to which many of the most respectable French practitioners have united themselves, and this society will have the object of elevating the profession, of removing the abuses which exist, and of placing dentistry in France upon an improved footing, such as it has taken in this country, and which its importance to the public makes it urgently desirable it should occupy. We wish all success to this new society, and we shall watch its progress with interest and sympathy.—[*Medical Press and Circular.*

DISLOCATION OF THE SUPERIOR MAXILLA.—Simple disarticulation of the superior maxillary bones is a very rare accident, but Mr. John Salter, of Tolleshunt d'Arcy, reports such a case. "The dislocation was," he says, "beyond doubt, inasmuch as the bones, in their wedge-shaped entirety, could be freely moved backward and forward, upward and downward, and from side to side. The separation of the malar bones from their articulation was no less distinct. A gutta-percha splint was applied, but it was several months before the patient, aged thirty, could bite solid food." In this case, at the time of the accident, the face felt like a quantity of "loose bones." Mr. South, in speaking of a somewhat similar accident, describes the bones as feeling like "beans in a bag."—[*American Practitioner.*

DR. WM. N. MORRISON, of St. Louis, has had the misfortune to have a leg broken below the knee. He is, of course, laid up for the present, and his friends in adjoining States will be deprived of his customary presence at the annual meetings of the state societies which occur about this time.

TO NEUTRALIZE the sting of a gnat or mosquito, French sportsmen rub the part affected with a little *cerumen*, that is, the wax of their ear, extracted by the little finger.

A PIECE OF LOAF SUGAR soaked in table vinegar makes a capital remedy for hiccough.—[*Detroit Lancet.*

THE POTATO BEETLE freshly powdered yields about one and one-third per cent of cantharadin.

PRINTER'S INK is a fruitful source of piles. Thin manilla paper is the proper thing to use.

NOTICE.

The American Dental Association will meet at Boston on the 3d of August next.

CORRESPONDENCE.

NEW YORK, May, 1880.

EDITOR MISSOURI DENTAL JOURNAL:

I believe the claim is made in England, that English dentists, who have been educated in their own country, are better informed in the medical branch of dental science than are the Americans, although it is generally conceded that the latter excel in manipulative art. The following article, taken from the May number of the "British Journal of Dental Science" displays a profuse carelessness in the use of arsenious acid which could scarcely have occurred in this country, for the reason that no American dentist would have been guilty of using it in so culpable a manner.

JUSTITIA.

"DANGER OF ARSENIC IN DENTISTRY.

Having within a short time met with several cases of the bad effects produced by the injudicious application of arsenic to diseased teeth, I think I ought to bring the subject to the notice of the profession; the more so because I believe that the mischief produced by its agency is rarely traced to its proper cause; also, because, from the frequency with which in my own practice I have lately seen it, I think that it is an increasing evil, and one that is far more common than is usually supposed.

A lady applied to me a short time ago under the following circumstances. She had consulted a dentist about filling a second molar tooth, decayed low down between it and the third molar. The dentist drilled away the decay; but, finding the tooth sensitive, he dressed it with something to allay the pain, directing her to return in two days. She suffered intensely for twelve hours. On her return the second molar was filled; and subsequently the two bicuspid teeth (being similarly dressed) were in like manner treated and filled. Day after day the pain continued with increasing intensity, and chloral had to be given to procure rest. After three weeks of this, when she came to me, she presented the appearance of a patient much exhausted by acute neuralgia. The third molar, which was otherwise sound, was so painful and inflamed that I had to extract it at once. The face was much swollen, the alveolus acutely inflamed, and an offensive discharge escaped from the wound. When, on probing the cavity, I felt dead bone, I at once made up my mind that arsenic was the cause of all this mischief.

The dentist who applied this solution had bought it (without knowing its ingredients) to destroy the nerves of teeth, and always used it for that purpose. On analysis it was found to contain almost nothing but arsenious acid. The result of this case was the loss of the three stopped and of one sound tooth, together with the whole of the alveolar wall surrounding them, two months' intense suffering, and all the necessary medical expenses, in addition to my fees and the cost of replacing the lost structures.

In a second case an officer in India applied a mixture containing arsenic (given to him for the purpose by the army surgeon) between two upper molars, to relieve toothache. He suffered so acutely that

he had to come home on sick-leave. He lost all the upper molar teeth and a large part of the maxillary bone.

In a third case, a week after I had taken out a lower tooth which was decayed below the alveolar margin, my patient returned with the usual symptoms of necrosis. Before consulting me he had used a tooth-tincture, procured from a chemist, to relieve the pain. The result in his case remains uncertain. At present there is considerable constitutional disturbance.

So many cases occurring within the limited area of one man's practice in so short a space of time is suggestive of an enormous amount of preventable misery. Arsenious acid should never be used without the greatest care to avoid its contact with the periosteal lining of the teeth; and patients should take care how they employ all so-called pain-killing tooth-tinctures, etc. It is a valuable agent when skillfully handled, but, if ignorantly or carelessly employed, arsenic may be a 'destroying angel.' "—N. STEVENSON, in *Brit. Med. Journal.*

BOOK NOTICES.

A TEXT BOOK OF PHYSIOLOGY. By Michael Foster, M. A., M. D., F. R. S. Prælector in Physiology and Fellow of Trinity College, Cambridge. 8vo, pp. 720. With illustrations. Third Edition. Revised. London: Macmillan & Co., 1879. St. Louis: H. R. Hildreth Printing Co. Cloth, $3.50.

Among the chief merits of this work are its clearness of description and the absence of that excessive verbosity which has long characterized our text books on Physiology. Add to these its cheapness, and it requires no prophet to foresee that it is destined, at an early day, to displace all other works on this subject now accessible to the English student.

The work very properly begins with a description of the properties of the amœba—the simplest physiological form—defining its powers of contraction, irritation, assimilation and reproduction, and then following with descriptions of the blood, the tissues of movement and the vascular mechanism. Although the arrangement is not altogether the most

logical that could have been chosen, yet it is convenient, and that is a prime consideration in the make-up of a text book. We have been accustomed to study nutrition immediately after digestion; and the office of the nervous system, in connection with the structure and quality of the nervous tissues; yet such a division is by no means necessary to a correct understanding of these subjects.

What he terms "vascular mechanism" comprises a branch of physiological study of the first importance to every earnest practitioner of any branch of medical science, and has very deservedly received a large share of attention at the author's hands.

Many new words and forms of expression are found in this work, and except in cases where the old word or expression fails to fully convey the intended meaning, we look with disfavor upon this tendency to which modern writers are so much inclined.

The work is purely physiological; psychology, and indeed all metaphysical questions being wholly ignored. It is fully up to the times, as far as it goes, but it strikes us that the importance of the nervous system entitles it to a fuller treatment, and also that the chapter on embryology is unnecessarily brief.

The work commends itself, and the fact that it has already reached its third edition evidences the cordial reception it has received from the professional public. While we may differ from the author in some of the conclusions which he draws from comparative physiology, we regard the work, as a whole, as being the best extant, and one which no one, whether he be student, investigator or practitioner, can read without profit.

BOOKS AND PAMPHLETS RECEIVED.

DISEASES OF THE MAXILLARY SINUS.—BY EDWARD BORCK, M. D., of St. Louis, Mo.

REFLECTIONS UPON THE HISTORY AND PROGRESS OF THE SURGICAL TREATMENT OF WOUNDS AND INFLAMMATIONS. A REPORT ON THE PROGRESS OF SURGERY.—By the same author.

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DENTAL EDUCATION.

There is no subject that more nearly concerns the future of the dental profession than that of education. It constitutes the chief means by which dentistry is to be brought to the level of other learned professions, and for this reason it occupies the thoughts and employs the pens of many of the best minds within our ranks. It is in this view of the importance of the subject that we have reproduced from the published volume of the "Transactions of the American Dental Association for 1879," the entire report of the Section on Education, together with the discussion which was called out by the report. We do this for the reason that the circulation of the volume of transactions is comparatively limited, being mainly confined to members of the Association; and we trust that those of our readers who are members of that body, and who have already received the volume, will appreciate and approve the motive which has occasioned the surrender of so many pages of the present number for this particular purpose.—[EDITOR.

REPORT OF SECTION TWO ON EDUCATION.

BY J. N. CROUSE, CHAIRMAN.

Notwithstanding the assertion which has become so familiar to us during the past few years—that the subject of education has

been exhausted, and that the time spent in discussing it is time wasted, your section on dental education believe there is no subject of greater importance for this association to consider.

The growing sentiment on the part of the profession at large in favor of raising the standard of dental education has been recognized by the colleges to be imperative, and has resulted in many of the advance steps recently taken by them; and this sentiment is due largely to constant agitation and discussion of the subject. Were discussion to cease, progress would cease; and a profession can poorly afford to rest on laurels already achieved.

The following points this section thinks should be most strongly insisted upon by this association.

1st. That all dental schools shall demand some degree of proficiency in English education as preliminary to entering upon professional study.

2d. That the college shall grant no diplomas except to those who attend at least two full courses of lectures.

Except that practitioners of dentistry who present satisfactory evidence of having entered upon practice prior to July 1, 1875, and of having continuously followed the same from that date shall, until July 1, 1885, be entitled to present themselves for examination for the dental degree after attending one course of lectures in a duly recognized dental school.

3d. That this association claims the right to exercise a general supervision over the whole subject of dental education.

In regard to our first proposition, the question very naturally arises, "what attainments shall be required of students entering our dental schools?"

The English Parliament has recently passed an act that dental students shall hereafter pass a good preliminary examination before they begin their professional training.

Under this law, the prescribed examination covers English, Latin, Arithmetic, Algebra, Geometry, Geography, English History and any one of the following branches at the candidate's option: Greek, French, German, Mechanics, Chemistry, Botany or Zoology.

To attempt the establishment of such a standard of preliminary education in this country would perhaps not be practicable at the

present time; we are not sufficiently well organized to secure such a law or enforce so desirable an advance. Yet this section is of the opinion that all the colleges should at once take an advance in this direction and require at least a *good English education*, and in addition should require the applicant to have sufficient knowledge of the branches taught and the language employed to comprehend the lectures.

There is no advancement proposed which the profession at large, outside the college faculties, are so unanimously in favor of as that of requiring a good English education as preliminary to entering upon professional study.

Second, your committee deem it very desirable that some unanimity of action be observed on the part of the colleges in regard to requirements for graduation.

On this point there is at present great difference. Some allowing five years' practice as equivalent to one course or lectures, some granting diplomas without requiring the applicant to attend lectures, and others requiring two full courses of lectures of various length.

If the colleges cannot agree upon some uniformity of action, this association should take steps to aid them in uniting on one basis.

While acknowledging the justice of the principle that a man should be entitled to a diploma when his acquirements come up to the proper standard, no matter where he has obtained his education —yet this association cannot sanction the issuing of such diplomas by parties who are peculiarly benefitted thereby; as college faculties, like "Cæsar's wife," should be above suspicion.

Hence your section feel that colleges should not grant diplomas to those who have not attended lectures, and that the policy of allowing five years' practice to equal one course of lectures should be abandoned.

This brings us to our third proposition, viz: to place the colleges and educational interests, to a certain extent, under the general supervision and control of this association. This proposition is brought before this body, at this time, for its consideration in the full belief that the power judiciously used would render the association of great assistance to the colleges in effecting needed reforms.

Some action was taken by this association at its last meeting

which was calculated to remedy the evil of colleges allowing five years' practice to equal one course of lectures, but it did not have the desired effect. For, although the association did not refuse representation to such colleges as pursued this policy, it expressed in strong terms its disapproval of the practice of dental colleges graduating students upon less than two full courses of lectures, believing it to be detrimental to the interests of dental education and advised the omission of such inducements from their annual announcements; yet, so far as this section is aware, none of the schools that pursued the five-year policy at that time have abandoned it; and the new schools which have sprung into existence since that action, each offer the five-year practitioners the inducement of a diploma by attending one course of lectures.

Even more, one of the largest schools that had previously abandoned the policy, publicly announced their intention of accepting the action of this association, and would thereafter regard five years' practice as equivalent to one course of lectures, and would receive such as candidates for graduation after attending one course of lectures; as though this association had recommended the practice instead of condemning it.

Therefore, this association needs to take some more positive action in regard to this matter than has heretofore been taken, and in language that cannot be misconstrued. This section, therefore, would offer the following resolutions:

Resolved, That hereafter no dental college shall be entitled to representation in this Association, that does not require a good English education as a preliminary qualification for its matriculates, to be ascertained by examination.

Resolved, That the colleges shall hereafter grant no diplomas, except to those who attend at least two full courses of lectures. Excepting that practitioners of Dentistry who present satisfactory evidence of having entered upon practice prior to July 1,1875, and of having continuously followed the same from that date, shall until July 1, 1885, be entitled to present themselves for examination, for the dental degree, after attending one course of lectures in a duly recognized dental school.

Resolved, That no dental college shall be eligible to representation in this Association, that does not, in its next annual announcement, give notice of its adoption of this limit to the conferring of the degree.

[These resolutions were adopted: see minutes.—*Pub. Com.*]

This section can but express great anxiety at the evident ten-

dency to multiply dental colleges evidenced by the birth of three or more since the last meeting of the association.

Even conceding to their founders all that they can claim, neither of them can, in the nature of things, hope to equal the best of those before in successful operation.

It seems to your section that the association should, by a decided voice, discourage this multiplication of schools which, in their opinion, can but tend to lower rather than raise the standard ot professional excellence. Concentration of interest in, and effort for, the best of those longer established would surely tend to the greatest advancement.

Regarding the question of whether dentistry is a specialty ot medicine, or not, as unimportant, yet believing that a medical education is a desirable preliminary to that of dentistry in the attainment of the highest success in its practice, we would urge the advancement to that acquirement by graduates in dentistry at the earliest practicable day.

DISCUSSION.

DR. SPALDING: As I dissented in the meeting of the section from one of the items in the report, I claim the privilege of giving my views upon that special point, which is the last one stated, namely, that the section regrets the establishment of additional dental colleges. The general expression in the section was that they did not want any more dental colleges, that there were too many now. I dissent in toto from that idea, and say that we have not half dental colleges enough. The only point to consider in the establishment of dental colleges is their quality. Bring them to every man's door, induce every man who contemplates entering the dental profession, however poor he may be, to enter a college and go through a regular course, and enter the profession by its regular door, and not feel obliged from his financial necessities to climb up in some other way. If we have a number of noble hearted and enthusiastic men who are willing to devote their time and their means to the cause of education, and who choose to organize a dental college at any cross-roads, if you please, and gather in the candidates for dentistry who happen to reside within their territory, and educate them properly, shall we say no, you must not do that, if these young men cannot go away to some distant

point they shall not have any such facilities to get into the dental profession, they must get in the best way they can? The grand idea is that we must make the holding of a dental degree an uniform thing throughout our entire land. The time is fast coming when no man will be recognized as a dentist who does not hold a degree. How is it to day? Not one-fourth part of the practicing dentists of the United States hold degrees, and more than that, not more than one quarter of those who came into the profession in the year 1878 hold degrees; and now the proposition of this section is to diminish these facilities so that in the future we should have, perhaps, ten per cent. No! if we ever hope to be a profession, if we ever hope to see the day when every man in our ranks shall be an educated man, we have got to extend the facilities for education. I think the proposition is a step backward, and I should regret to see a body like this take it. We should be for onward movement. I, of course, voted against this expression in the section, but I believe I stood pretty much alone, and therefore the chairman was justified in saying that the report was nearly unanimous. I am reminded by the chairman that I have been in favor of conferring degrees upon competent men who have not attended two courses. My doctrine has been, that when a man can come up to the proper standard we should not stop to inquire where he obtained his information. The question to consider is, is he competent? and if he is, let us give him the evidence thereof. The section have considered the matter of making some provision for that class of men who do not hold degrees. No very definite proposition has been entertained, and nothing done, except the provision contained in one of those resolutions, that every man who commenced practice previous to July 1, 1875, and has been in continuous practice since, may, upon attending one course of lectures, obtain a degree. I have no definite scheme to propose. In fact it has not been sufficiently digested, and the only object of these remarks is merely to save that point in the whole question. One important suggestion was made, and that is that the examination of such candidates should not be made by the faculty of the school that grants the degree. In that I most heartily concur. I think the examination should be made by entirely disinterested parties, and I will go further and say that the fees which he pays

for his degree should not result to the pecuniary advantage of the institution that grants it. They should have nothing more than enough to pay the expense, and the balance should go to some other fund.

DR. BOGUE: I feel very much like endorsing all the ideas that Dr. Spalding has expressed. I do want that word anxiety or regret put into that report, for the reason that Dr. Spalding has expressed. To begin at the latter end of his remarks, I believe he is the first gentleman connected with any dental college who has here, upon this floor, announced his acceptance of the doctrine that the examining board should not be under the influence of the teaching faculty. I honor him for that expression, and it seems to me that it will not be very long before that view will prevail much more extensively than it does at present. No one who has looked carefully at the working of dental or other colleges can have failed to see that the influence exerted by even two, or three, or four months of intercourse with the student must bias the professors. Dr. Spalding asks what we shall do with young men who would enter into the practice of dentistry through some other door than the colleges. I think we should pass state laws and keep them out, if they will not enter through that door. It seems to me that is the tendency of affairs, and as these state laws are passed, one by one, the young men who desire to enter into the practice of dentistry will necessarily go through a process of natural selection—those that should never come in, so far as we can arrange that matter, will not come in, as they will be obliged to go through the colleges to obtain their object. Hence the multiplicity of dental colleges I look upon as a necessity to be regretted, but still a necessity. I fancy that they will be wanted. The good ones will stand. When Dr. Spalding suggests that we should make a uniform degree which should be imperative throughout the length and breadth of the land, I wish to concur with him. These ideas are presented more vividly to me at this time because I have been noting the far-reaching tendencies and powers of that English law which has been alluded to. There may be two or three gentlemen in this room who know the ins and outs of that law; to me it is marvelous. There is a degree of feeling between the British professional men practicing dentistry and the graduates of American dental colleges, who

possess, perhaps, finger craft, but who in other essentials of education may be infinitely below their English brethren, that is hard to understand and impossible to describe. It is not seen upon the surface, but it exists, nevertheless, and becomes manifest in the law recently passed which recognizes the graduates of only two of our thirteen or more American colleges. One of the causes for the passage of that law, which is a far-reaching, and in my view a most wonderful, enactment, was the practice of English students of going to America for their second course, or their graduation, whence they would return legally "Doctors," while their qualifications as professional men, or for social standing, were greatly below those who had staid at home and gone through a course of training much more profound and searching than any of ours, and yet were not doctors. This was a condition of things that could not long exist; so, as before stated, they have closed the doors against the graduates of all American colleges save two, although the right is reserved to extend the list of those whose diplomas will be recognized when it shall be proven that the curriculum of any other school shall be equal to the requirements.

DR. STOCKTON: I have thought the great thing was to have only a few large dental colleges in the land. I was in sympathy with the resolution of the section, but I must confess that since Dr. Spalding has spoken I have somewhat changed my mind. There are a great many young men coming into our profession through our state boards, and these examiners cannot be so well qualified to give a certificate as those who have been long teaching in the schools, and I therefore have, since sitting here, come to this conclusion: that it is best to say to these young men, you must go to the dental college and take your diplomas, no matter whether they staid there one year, one month, one week, or one day, if they are qualified to practice Dentistry; and if they are qualified to practice, the college should give them the certificate; but the examination should be such, and the degree be such, that when once given, it would never after be questioned. We are making dental colleges all through the land in almost every State, and if you open these dental colleges where men can get their degree, they would rather have it than from any examining board. Make it so that they can get it without expense, but have the standard so high in all that

which pertains to Dentistry, and also with reference to their English education, that it will be beneficial to the young men. We know that those who have had a previous education, such as it ought to have been, when entering our profession, take the highest rank among us. I believe this will be the grand solution to this question that is before us to-day.

DR. SHEPARD: I move that the motion that this report be adopted be laid upon the table.

The motion was agreed to.

DR. SHEPARD: I now move the adoption of the resolutions, which brings the whole matter before us for discussion.

DR. SMITH: I would like to read some statistics. It is affirmed that there are in the United States 12,000 practicing dentists, those who have a local habitation and a name. I think it is a proper estimate that there are legitimate students of dentistry, with those 12,000—at least 1,800 to 2,000, who contemplate pursuing dentistry as an occupation. Last year the matriculates of all our colleges numbered 672, of whom fifty were foreigners, leaving about 622 matriculants in our colleges from the United States. It is curious to know where those students come from. I cannot give you the statistics as to where the matriculates come from, but I can only give you the statistics as to where the graduates reside. Before proceeding to that point I will state the number of graduates. There are sixteen States who graduated 158, all the other States 51, giving 209 graduates altogether in all the colleges from the United States. This is nearly accurate. There were thirty-three foreign graduates, making 242 graduates in all. I have estimated that there are from 1,800 to 2,000 legitimate students, which would give about fifteen to every 100 in practice. Now you see if all the dental students went to college, each college would have about 200; but, as it is, as we only have about one-third in the colleges, some of the present number of colleges are impoverished for want of students. You will not find as many students in large cities with practitioners as you find in the country. I know of some country practitioners who have three or four. There is Illinois with her 400 dentists; last year she had three students that graduated, possibly four. There were about nine students in the colleges from this State, because the graduating list indicates the number in the col-

leges. Some of the colleges graduated four, others two and three. Harvard, the more advanced college, had thirteen students and graduated but two or three. These are some of the facts which have a bearing upon the subject, and it is well to consider them when you theorize about dental education. Especially should members of this section ponder the status of dental education in their own States while proposing changes called reforms in the methods of the colleges.

DR. CROUSE: How do you get at the number of students, if you call them students, that there are in the United States; how do you make it 2,000? And I would ask another question: how long would it take to multiply the number of practitioners from 12,000 to 50,000 at that rate of students each year?

DR. SMITH: It is an approximation. It is my judgment and that of others. Probably there are large numbers retiring. And there are many who are not fit for the business of dentistry, and very soon engage in other occupations.

DR. CROUSE: They never go out.

DR. SMITH: They go out very frequently from a variety of causes. Not a few are unable to make a living.

DR. SHEPARD: As a matter of fact, the statement with regard to Harvard is not correct. There were five graduates last year, 1878–9, out of thirteen in the class—in 1877–8 there were six graduates with a class of seventeen.

DR. SMITH: I don't claim accuracy of course. It is an approximation.

DR. CROUSE: The question is now, what are you going to do about it?

DR. SMITH: That is for you to say. Some say, advance the standard of dental education. I have my reply, but I am not giving that. It is peculiar that the large bulk of students came from very few States. Last year Pennsylvania had 39 graduates, Ohio 24, New York 18, Massachusetts 17, and Maryland 15, making in all 113. Those five States, it will be observed, had more than half, and the balance of the States had only 96. Of those States, Pennsylvania, Ohio, and New York have State laws regulating the practice of dentistry. We find, also, that in those States are located the older dental colleges.

DR. COOK: In regard to New York, I will say that the law now in force does not affect, in any way, the number of graduates. There is nothing in the law that requires any man to take a degree. There is a law, passed at the last session of the Legislature, but not in force yet, that may possibly affect the number of students at our dental schools.

DR. SMITH: Where there are facilities for obtaining dental education we find the largest number of graduates. Those States which have had dental colleges the longest time furnish the bulk of graduates.

DR. BOGUE: I am reminded that I conveyed a false impression. I stated that the college of surgeons in England were able, in view of this law which has lately been passed, to extend their time and enlarge their curriculum. In so doing I put the thing exactly back-end foremost. They did extend their time, and they did call for an examination in arts, and then they found their classes dwindling. The law was the remedy for that.

DR. COOK: I would say *a* remedy. The discussion in reference to a law in the United Kingdom, regulating the practice of dentistry, commenced some three years before it was passed by Parliament. Large meetings were held at various points in the kingdom and all questions bearing upon it fully considered, all of which is a matter of record. There is no reason to believe that the presence of a few American dentists in England, or the desire to keep their students from going abroad to procure a diploma on qualifications inferior to those required at their own schools, was the exciting cause of the demand or request for a law. The same reason might as well be assigned for the passing of "dental laws" in our own States. If I rightly understand the last speaker, his remarks do injustice to our friends over the sea, and I think I pretty well understand what has been said and done, as far as their journals make record. I do not see the injustice of *not* permitting the registration of foreigners on qualifications inferior to those demanded of their own people. It would seem to be only justice to their own licentiates that such discrimination be made.

DR. CROUSE: I did not intend to speak upon this subject, but, as the discussion has taken a conversational turn, and seems not to be leading up to the points under consideration, which are the res-

olutions before us, I wish to say a few words. The first of these resolutions requires a preliminary education for those entering the schools. This, in my opinion, is a step that all colleges can judiciously take, and I think this Association can, by its voice, assist them to that advance, and, as near as I can find out, it is the desire of all the colleges that this advance step should be taken. We were enthusiastic in our section on the passage of this resolution, and I think it needs no discussion. The gist of it can be seen at a glance —that we should have an examination in reference to English education, and would-be pupils should have a sufficient knowledge of the subjects to be taught, to enable them to comprehend what the lecturer is talking about. If the pupil enters college without any knowledge of anatomy or chemistry, he will not be able easily to comprehend the lectures upon those subjects, and his time will be, to a great extent, wasted. The second resolution is the one we had up last year, with an amendment. The resolution which I would like to see this Association adopt would be, that no college should be allowed representation in this Association that did not require two full courses of lectures; but as a compromise measure, and in order to have our reports go in as the reports of the section, we attached this amendment which allows colleges to grant diplomas to such as are qualified, who entered the practice of dentistry before 1875 and up to 1885, giving about five years' continuance to that plan, with the understanding that after 1885 the five years' policy shall be done away with. In talking with the representatives of different schools, I am delighted to find that the tendency on the part of a great many is to make the course for graduation three years, instead of two—an advance of vital importance; for what can the average student acquire of anatomy or chemistry alone in one or two courses of lectures. He will not become an anatomist or a chemist in that length of time. This want of thoroughness in our schools heretofore will, in a measure, explain why we have had no report on chemistry this year. My friend Spalding has expressed a great deal of sympathy for the poor man. The fact of the business is there are many born to be poor men. They will be poor in the profession or out of it, and we can't help them. You present to the right kind of a poor man a plan for his education and he will work to it, if it takes two years or three years, and if he has not the ma-

terial in him to enable him to do this, he is not fit for a dentist anyway. I had a young man in my office for a month, some time ago, and I said to him, "you go back to your father's farm and stay; you will make a good farmer, but you will never make a dentist." If a man cannot get down to study, if he has no memory, if he has no application, and no mechanical ingenuity, he cannot make a dentist. It is no kindness to young men to make the educational standard low. After they get into practice and see that it would have been for their best interest to take a more full course, they will blame you for this easy method which you now so generously offer, and will say: "I wish you had compelled me to take a more full course and to prepare myself more thoroughly before I started to practice." Let us increase the facilities for real learning, and encourage those institutions that now possess them to the greatest extent. Many of these dental colleges are started from purely selfish motives; for instance: a dealer in dental materials starts one, believing it will be of advantage to his trade; a medical institution that has not a very large list of students attaches a dental department, hoping to increase its revenue, and enabling it to swell the numbers in its circular. I am sure that this multiplying of colleges mainly tends to cripple good institutions. A fellow who has any snap can pay the expense of attending two courses of lectures. If he has not vim enough in him to do that he is not fit for the profession.

DR. WERNER: I think dental education, like general education, a most important branch of sociology. Sociology and biology have close relations, and move in the same course of development. This is a free democratic republic; we consider here that no laws are necessary to protect medicine or dentistry. In European countries it is considered necessary to protect the medical as well as the dental profession, consequently they have fewer colleges and higher standards. As long as we have no law to protect our profession in America it is useless to talk of a few colleges and higher standards. That is the experience of older nations, and America will learn it very soon. England has decided by its law, lately enacted, to protect dentistry. America has not as yet spoken in that way. I am advocating laws to protect medicine and dentistry, unless we can rely on the intelligence of the masses as sufficient protection. The masses do not think it their own interests, or they would ask for

protective laws. They do not ask to be protected from a lack of intelligence upon the subject. When they do ask it they will have just what they ask for.

DR. ATKINSON: Who has been to the foundation? Who knows whether he has built upon the rock or the sand? What does the degree mean? We have sixty-five medical colleges chartered, and graduating pupils every year in the United States. Are there five of them that ought, by common honesty or legitimacy, to be permitted to graduate a single M. D.? We have thirteen dental colleges who graduate men for the practice of dentistry. We are trying to get at some means whereby to select from the mass of pupils that present themselves as matriculates to the various schools of dentistry, so that we can discriminate, and secure thereby efficient, honest, upright men, that shall be a blessing to the community, a comfort to themselves and an honor to their calling. How shall we do this, is the question before us. That is the underthought of every individual who has spoken, and I agree with all the speakers in a certain sense, and disagree with them all in a certain sense, and that is the sense that we need not quarrel about; it is a sense of the disabilities that we have inherited from the abominable methods of our general education in the public schools, in the seminaries, in the colleges, and in the universities, because they have built upon sand. When the weight of the building became great enough it toppled over. If I were required to make number-one dentists of 500 young men of good natural qualifications, I would prefer to have them without A. B., A. M., or M. D. attached to their names. And why? Because they have had such miserable methods by which to make those examinations, that they, every one, are false. There is not an M. D. in the United States of America this day that is not a lie upon the face of it. It tells what is not true, as to the qualifications of the man holding it. It says he is entitled, by legitimacy, to all the rights and immunities belonging to this degree. Will you be surprised if I say what I have repeatedly said before, that I am sorry that there are any degrees at all? I see I am not making the other point. I said I would rather not have them with these false and mischievous methods of education upon them, but take them green and fresh, and in five years make them better scientists and operators than

they can possibly be made by these men who have dubbed them A. B.'s, A. M.'s and M. D.'s as qualifying conditions. They have led to what the simple degree says, not what it means, because they do not know what it means. They do not have the knowledge of what it ought to mean. I do not say we shall be any more honest than our ancestors, and our predecessors, and teachers; but we shall be more illuminated, we shall have better light by which to direct our steps in the performance of the works conceived in our affections and intellects, and we shall be able to make less crooked ways to our feet, and we shall be able to be justified in our own consciences and the opinion of our pupils, if we will forget the old methods and begin to study anew, teaching our pupils conversationally and demonstrably. It has been said we have never had any report on chemistry. As differential chemistry, I hope we may never have a report on it. If we were to follow the leadings of these men who call themselves chemists, and offer the doctrine for acceptance, I hope we will never have. There is a chemical aspect to everything we do. We must learn a little about the old, dignified objective and subjective; and we must so understand these first postulates, as to enable us to be teachers that shall so commend ourselves to our pupils as to be sought for in places of trust and responsibility. I know what I say, I have seen what I speak of, and testify the conviction of my own mind that we have no college to-day whose chairs are filled by men pre-eminently fitted to occupy the various seats in the various faculties of the various institutions.

DR. BARRETT: If I understand Dr. Atkinson aright, he would abolish all education whatever in dental institutions; for, if he says he would have them without any education, he necessarily goes back to that point.

DR. ATKINSON: By preference to taking such as they are. Don't misrepresent me.

DR. BARRETT: I did not use the words as he spoke them, though I might honestly have done so. He can put his own construction upon them. What is the point at issue? We are talking about the education that we have; how we can make it better; how we can arrive at a higher standard; whether by increasing the number of colleges, by establishing preliminary examinations requisite for

entrance to colleges, or whether there should be no examination at all. The first resolution provides that there shall be such preliminary evidence of scholastic training. We are supposed to be considering the materials that are offered, and, if I understand the drift of Dr. Atkinson's remarks, it is that no qualification should be demanded of a student for entering a dental college. I think we will take issue with him on that ground, because for the proper understanding of the truths of the principles that are taught in dental colleges, it requires some prerequisite English education. As a preliminary step, it is absolutely essential that a man have some knowledge of the construction of the language which is to become technical. But what shall be done? Is the door to be closed? Are we to relegate professional training to a few dental colleges? Is that in accordance with the demands of the dental profession, or of any profession, that it shall be only for the favored few? By no means. I think we should in professional, as in general education, open the door of opportunity to every one who comes knocking at the portal, and place the means of obtaining knowledge within the reach of every man. We may not all agree touching the general theory of the doctrine of evolution, but it will be beautifully adapted to the necessities of the dental profession as regards colleges, and will result in the survival of the fittest. Place a dental college at every four corners, if you will, simply premising that the teaching shall be sufficient, and the law of supply and demand will settle which shall live and which shall die.

DR. STELLWAGEN: It is only by elevating ourselves that we can elevate our profession. If we individually are so exalted by education that every one who comes in contact with us will recognize that to be a dentist is an honorable calling, I do not think that we will be at any trouble about having laws to protect and laws to govern. As to how this shall be accomplished, of course there is a vast difference of opinion. At the very outset there is a question as to what sort of material we shall make dentists of; in other words, what sort of men we shall admit to dental colleges. If I may be allowed to take exceptions upon the floor, as in the committee, I object to the narrow-minded view that a man must have an *English* education. The gentleman who preceded me spoke of sociology, and spoke very pertinently and to the point. Sociology

brings about the study of a great variety of ologies, and among them is one which we call philology, and the man who is a philologist can quickly grasp a new language. Hence, for us to claim that a man must be educated in the English language is an assumption that will contract the scope of the profession. You are to require them to have an *English* education. What has it to do with dentistry to know whether the Plantaganet or the Guelph family happened to be the governing family of England? Teaching at dental colleges does not depend alone upon the use of language. There is a common language of science which enables two men, not speaking a common tongue, to have scientific intercourse with each other. A learned German, or a learned Frenchman, or a learned Englishman, all use technical terms nearly similar. In addition, education is imparted by means of illustrations and demonstrations. It is astonishing how early a man not only acquires the art and science of dentistry, but at the same time the English language, by listening to the descriptions and seeing the manipulations before him. Hence, Mr. President, I should move that the first resolution be laid upon the table. It is exceedingly difficult for us at present, certainly it is too early for us to establish any such line of demarkation.

With regard to those who are already in practice. How long does it take to examine a man and decide whether he is a practitioner or fit to become a practitioner of dentistry? I hold that it cannot be done in a few days or a few weeks, as some gentlemen here seem to think. Will any one be perfectly satisfied to endorse another by signing his diploma if he has been in view for a few days only, and had, perhaps, fifteen minutes' conversation with him in the way of an examination? If this be just, it opens the door to one of the most dangerous means for undermining the standard of our profession. It requires months of examination, as they stand n a class, as they answer the questions that are put by the examiners or the professors, to enable us to judge whether men are fit to practice dentistry or not. It would be most desirable if we could have a board composed of the very finest talent for making this examination, that could spend enough time every year and perform the duty thoroughly. But any examining board that merely brings candidates before it for a few days, would be very apt to allow incompetent

ones to enter the profession. With regard to the multiplication of colleges, we cannot *regret* the tendency to an increase in the number, until we see that they have done harm, but we can have an anxiety as to the results of such additions because there are not sufficient students to support so many. I do not mean dirty dollars, but rather the stimulus of seeing a class around who look up to the lecturer, and drink in what he says, and awaken him to his best efforts. That is what I understand this association should express —an anxiety lest, by an overplus of colleges, the standard of education may be lowered so as to coax and persuade ineligible men to enter the colleges, in order to get sufficient classes. Does any school shut out worthy men for the want of money? We have had it said that the spreading of colleges broadcast over the land was necessary, in order that we should accommodate students who could not afford to come a long distance and spend much money. Those who pay for their ticket, and work for the money to pay for them, are generally those who become most creditable members of the profession. But there are others, such as our friend from Chicago has spoken of, who come begging their way through college and into the profession, and then beg their way through life. I have seen but few of these men who ever amounted to anything. It is the man that has the energy within him, and who says, if he has not the money, "I will sign a note and promise to pay it, I do not want an education for nothing," who makes his mark. Such can always be accommodated. I do not think any school in the country wants money alone. When I perform a dental operation I do not take the money as an equivalent for services rendered, but as an acknowledgement of that which money cannot pay for. Others may take the money if they please, and feel in taking it that they have taken their full fee. The tooth-carpenter and the professional dentist are not in the same category.

DR. SHEPARD: A large part of the gentleman's speech has been taken up with an oration on philology, being nothing but a quibble upon the phraseology of the first resolution. I should suppose that any person of intelligence and cultivation, who had mingled much among men, would understand that the phrase, "a good English education," was but another term for what is otherwise expressed as a common school education. The idea of objecting on that

ground is but a quibble and not an argument against the resolution, and I was very sorry to hear him announce that he was going to move to lay the resolution upon the table. The proper thing to do, it seems to me, is to suggest an amendment rather than to put it where it cannot be discussed anymore. I will not say that it cannot be improved, but ordinary minds would understand it as a good common-school education, such as is possessed by any graduate of a high-school, or by any graduate of a German gymnasium, whether he understands the English language or not. A large part of the discussion upon these resolutions seems to me to have been taken up by fault-finding and grumbling against the present condition of things. There are always plenty of grumblers who are not satisfied with things as they are. We are all of us in that chronic condition. The section which reported this resolution is in that condition, and is trying to suggest a remedy. There has been almost nothing said, directly, upon the question of the adoption or rejection of the resolutions. I am in favor of the adoption of these resolutions. They do not come up to my views. They are very far behind what I would like to see adopted. I grumbled a great deal at these resolutions in the section, but they have been reported by the section as a compromise. Members of the section made their little speeches in the section in regard to the resolutions, and as the result of those speeches the compromise was adopted, and they united in the compromise, but now they come here and make similar speeches in opposition. Are the resolutions an advance? That is the first question. The second question is, are they as far in advance as the association is prepared to adopt? Those are the only two questions. If they are in advance they should be adopted. If they are not as far in advance as the association is ready to vote, then amend them and put them a peg higher. It can be done in several ways. One way is to amend the second resolution by putting the date back to the first of July, 1870, instead of the first of July, 1875, cutting out the men who have entered the profession during the years between 1870 and 1875 from participation in the one-term course. If I may speak of the action of the section, the original motion in the section was to make it 1870, but the compromise of 1875 was carried, which opened the door still wider. I wish the association were ready to vote 1870

instead of 1875; for it is a step higher. If 1875 is too high for the association to vote, it can be made '76, or '77, or '78, and so admit a still larger number of the great mass throughout the land who have no degree. I am on record since 1872, in this association, as will be found in the transactions, in opposition to the granting of degrees by the colleges upon one course of lectures, but I have been willing that certain colleges should do that if they pleased, so as to keep the doors open wide for those worthy practitioners who had failed to avail themselves of the privilege, but I think a great mistake will be made by the association at this day, when these doors have been open for thirty years, if it does not take the stand that our colleges are not merely institutions for the graduating of men, giving them their diplomas simply to entitle them to a legal doctorate, but are for the great purpose of educating young men and bringing them forward in a legitimate, correct and proper manner to enter the profession through their doors. That time, I think, has come, and the association should take the stand now that they should look to the young men—the new-comers into the profession—and leave those where they are who have neglected the advantages previously offered. The first resolution covers the subject of a proper preliminary education. The second resolution covers the point of one course of lectures, and I hope to see it adopted. The third resolution does all that this association can do as a body corporate, which is to exclude from membership those colleges which do not adopt the course prescribed. I would go still further than that individually, and claim for this association power to legislate more strongly and bindingly on the colleges; but we cannot go as far as some of us would wish. I hope, therefore, to see these resolutions adopted, substantially as they are, or amended to make them stronger.

Dr. HUNT: We are all engaged in one common object, and that is the advancement and improvement of our profession. We only differ as to the means necessary to attain that object. It was remarked in the report, very happily and properly, that the subject of dental education was not by any means exhausted. We are in a progressive state, and it is our duty to do the best we can under the circumstances. It has been said that the shorter term of pupilage has been offered by some colleges as an inducement to those who

wished to enter the profession of dentistry, to come to those institutions and get their diplomas in a short and easy way. The college with which I am connected offered what they call that inducement. It took the ground that the standard for granting a diploma should be merit alone, qualification and proficiency in all the branches which are necessary in the practice of dentistry, and not the length of time which was consumed in study. At the same time the college placed the standard as high as they dared to, which was as high as that of any other college in the country; and that is the correct principle—one which has been adopted by the John Hopkins University of Maryland, which has at its command all the money that is necessary to carry out any system. It was adopted after careful deliberation upon the best information that could be obtained concerning educational systems. We had an examining board for the college I refer to. I am very glad that Dr. Stellwagen put forward his argument intended to demolish the position taken, of the advisability of an examination by others than the faculty, because his argument is demolished by the statement I am about to make. The board of regents, which is the examining board I refer to, examine only those who have passed the faculty, and received their approval; and if the board does anything, it is to turn back, as it has the power, those who have been examined by the faculty, if the latter has made a mistake. With regard to the preliminary examination referred to in the first resolution, I heartily agree with the position assumed of the absolute necessity of a preliminary examination by the faculty of a college, who shall have the privilege of saying what material shall come into their hands for dental instruction. If a man cannot write a good grammatical letter, if he does not understand the English language sufficiently for that, he certainly is not qualified to learn a profession, whether dentistry, medicine, law, or theology. This cutting down of the course to one term is intended to meet those cases that the section thought required to be made an exception of. The time will come when all those who are now practicing dentistry will have either gone to their long home or have entered the profession through the door of a college. When that time comes, we cannot say that the matriculate can graduate in one year, but at this time the necessity exists, which the section recognized, of making exceptions to that rule.

With reference to the multiplication of colleges, I will only say that the section takes the ground that a college should be established where a college is proper and necessary, and not otherwise. We in Maryland and the District of Columbia have concluded that two colleges are too many for that locality, and so have consolidated them, and in the consolidation our faculties have been united.

One more point I wish to touch, and that is, that the whole tone of the report takes one position which the resolution does not. The tone of the report claims the right to prescribe what colleges shall do. I agree that there should be a single association in this country which should have the legitimate, conceded, and delegated right to control colleges as to their general standing, and as to their standard of education. We have not, at this time, that right. I cannot vote for the second and third resolutions; though conceding the right of this association to make the claims set up in them, I do not think it has the delegated authority to support or justify those claims. The first I shall vote for.

DR. PEIRCE: I wish to refer to the difficulties in the way of adopting any common standard of qualifications. Some time since I attended a meeting of the representatives of forty of the medical schools of the country, called for the special purpose of adopting such a standard. After two days spent in discussing the subject and perfecting resolutions embodying the ideas of the representatives, the vote on their final adoption was taken, and the resolutions were lost, the representative of one of the leading colleges stating that their work could not be binding on the schools, but would be merely advisory.

I shall second every effort of this association to urge upon every school to take that step, and advise a preliminary examination, establishing some standard which every student must attain before he can come into the college; but we shall probably have the same difficulty in establishing this course that the medical fraternity have had.

DR. SPALDING: I was aware of the results of these deliberations, but I hold that we are not to be guided in our course by any examples that may be set by the medical profession. We are an independent profession, in my opinion, and we must mark out our own course, and decide what we shall do for ourselves. In the estima-

tion of medical men, undoubtedly they thought the prosperity of their colleges would be affected by such restrictive action. Perhaps that may be the same case with us. Suppose it is. What of that? The question we are to consider is whether it will aid the profession. I think no one can question that the future of our profession will be advanced by enforcing this requirement. Therefore I am in favor of it, having acted upon that plan ever since the college I am now connected with has been established. I am satisfied with its operation, having rejected a number of applicants for the reason they had not the proper preliminary qualifications. We know exactly how it works, and we know it works well in the main. You may lose now and then an applicant, but you will soon establish for yourselves a reputation. I am earnestly in favor of that provision, and hope it will be unanimously adopted.

DR. REHWINKLE: It seems to me that with the present light we have on the subject of education, we ought not to have any great difficulty in coming to an intelligent conclusion in regard to these resolutions. We now have arrived at the time when we must do either one or two things, we must adopt these resolutions in such a way as will give an earnest evidence to the students, as well as to the public, that the colleges mean precisely what they claim in their announcements; or else we must acknowledge that the whole thing is mere buncome. Now if there is any dental association called upon to sustain the colleges, I won't say prescribe for the colleges, but to sustain them in their earnest efforts to do their best, it is, I think, this association. In regard to preliminary examination, I differ from my friend Stellwagen in his blind criticism upon the phraseology of the first resolution. I understood at once that it meant a common school education, such as the laws of this country provide for all citizens.

Our desire is to secure a better professional education for practicing dentists, and, also to convince the public that our dental colleges send out educated men. If we ignore the preliminary common school education, illiterate men, though they may often acquire great skill as manipulators, may yet, for the want of this education, which all professional men are presumed to possess, often bring disgrace upon the profession as well as upon the dental college which graduated them. I cannot see that there should be any objection

to this resolution. It seems to me every one should agree with it, and that it should be made as binding as possible.

In regard to granting diplomas regardless of study, there is something to be said on both sides. In the abstract that principle might be correct, but we must bear in mind that a college faculty is not a board of examiners, placed in power by the State, or by any other authority, simply to pass judgment upon certain qualifications of the candidate. When a college issues a diploma it conveys a certain degree of honor and distinction with it. The diploma carries with it the whole moral force of the institution that issues it, and, therefore, I think a dental college ought to insist upon students passing sufficient time within its own walls to acquire the proper knowledge through its own professors and by its own peculiar manner of teaching, before granting diplomas to them. If the principle referred to is to be adopted at all, it seems to me that as far as it would be proper to carry it would be for colleges to simply grant a certificate of qualification, without conferring any title.

As the colleges only are entitled and privileged to confer degrees, we certainly ought to require of them that they shall insist upon an education within themselves. I agree with Dr. Stellwagen, that a thorough knowledge of a student's acquirements can not be learned from an examination, unless it is extended over a considerable length of time. College faculties, as well as examining boards, very soon fall into a routine way of examination, and many succeed in passing when really the faculty or the board which examines them are not properly enlightened as to their real qualifications. Allusion has been made by Dr. Bogue to the low estimation in which our colleges are held in Europe. During the summer, I learned from a gentleman from London, a graduate of a reputable dental college in Philadelphia, and a man of note, that upon presenting his diploma to the Registrar he was told that they did not recognize it, nor any diplomas from this country except those issued from universities. Another reason for the disrepute of our colleges abroad may be found in the fact that there is a person whose name is John Buchanan, claiming the title of M. D., whose advertisement I find in the "British Review," which I hold in my hand, of the "American University Dental College," Philadelphia. When we bear in mind that this bogus institution is perhaps better known in England than

it is in America as a miserable fraud from beginning to end, and when we bear in mind that this advertisement has been published month after month in such a respectable journal as the "Monthly Review," and that many of these fraudulent diplomas have been sold throughout Europe, it ought not to seem strange that they do not think much of the title D. D. S. I have the evidence in my hands showing that diplomas have been granted to parties who have never been inside of the doors of this institution, and who could give no evidence of adequate knowledge and acquirements in dentistry, if, indeed, they had any. This proceeding has been going on from year to year, to the disgust of qualified English dentists, and hence it ought not to appear strange to us that the title of D. D. S. is not highly esteemed by the profession in England or Germany, where a great many of these diplomas are bought. There has been considerable discussion in Germany in regard to the character and merits of our dental institutions, one party contending that the fraudulent institution which is advertised in foreign countries only, and which hardly one in a thousand ever heard of in this, is equally as respectable as the other dental colleges in Philadelphia, colleges of high respectability and which are recognized as such by the profession in this country.

A certain Mr. Chapison, of Berlin, has published a little pamphlet, entitled, "Anti-Petermann," wherein he strongly upholds and endeavors to prove the respectability of the above-named bogus institution, and others of like character; whereas, on the other hand, he cannot say enough to belittle and defame the Pennsylvania and Philadelphia Dental Colleges. He represents the fraudulent institutions of John Buchanan as great "State Universities," and the highly respectable dental colleges as mere private and obscure "tooth-breaker shops." These statements, although preposterous and absurd, are, nevertheless, believed by some and upheld by others, who are the victims of Buchanan's frauds, and possessors of diplomas of universities of fraud.

As the title of this pamphlet indicates, it is a personal attack upon Dr. Adolf Petermann, of Frankford-on-the-Main, who has, through his dental almanac, exposed the doings of John Buchanan, and put a check to the traffic in bogus doctor diplomas of so-called American universities. He has upheld and even stands ready to defend the character and integrity of our dental colleges.

THE BRITISH DENTAL ASSOCIATION.

BY OUR ENGLISH CORRESPONDENT.

This organization is the first to demonstrate the folly of the reformer's schemes. It had its origin, as intimated in my last communication, in a great meeting of over two hundred dentists, whose presence showed how ready the profession is to enter into good and earnest work; for these gentlemen had been got together under the impression, from the high sounding title of the proposed society, that something real, practical, and useful was at last to be inaugurated. The real character of this organization was brought out at the inaugural meeting and the result is that less than one hundred and eighty, out of over three thousand men, registered as dentists pure and simple, have enrolled themselves as members. And I am told by a gentleman who has unusual opportunities for knowing, that some of these have subscribed under an impression that, as it is in reality a Dentist's Trades Union, there must be funds available to the members in case of sickness or death. These one hundred and seventy odd members have contributed one hundred and ninety pounds toward the accomplishment of the task the promoters profess to have in view, namely, the removal of as many names as possible of the two thousand chemist-dentists who got on to the register by means of their own indiscreet threatening of what they were going to do when they got their Act of Parliament. As it would cost, on an average, at least fifty pounds, each name, to get together such evidence as would be necessary to induce the Medical Council to expunge it from the register and to pay the members of the committee of the council appointed for that purpose—for these gentlemen have to be paid—for their time spent in adjudicating these claims for removal; even if there was no legal contest over the matter, it can easily be determined how far this association is from even a beginning of its arduous labors.

Yet with that indifference to realities, characteristic of the reformers, they are forming branch associations. One has been inaugurated in the West, and now we are to have one in the North. In accordance with previous proceedings, after much exertion, a small

number of dentists were got together at a private meeting in Manchester, at which the secretary of the British Dental Association presided, and thus was the ball set in motion. The character of this meeting can be judged by the report of its proceedings in the "British Journal of Dental Science," which calls attention to the "conspicuous absence of several of the old established practitioners of Manchester"—and it should have added Liverpool, as well as other towns. In order that this point should be made clear, the names of the absentees were given.

It is a matter for rejoicing that the profession in England has so signally condemned this absurd scheme—if it ever was really intended—for spending a vast sum of money over a matter that is not worth a moment's consideration.

What harm will the retention, and what good would the removal of the chemist-dentists' names from the register accomplish?

It is really not a matter of the slightest importance to the dentist with a respectable practice who is or who is not on the register; for, professionally speaking, he lives in another world to all the objectional elements on that patronymical conglomerate. To the inferior men it may possibly be of some importance; although even their anxiety is, I fancy, a good deal overrated. The presence of the names of the chemist-dentists on the register is not evidence of the wisdom of those who made it necessary, by their bluster, for them to be there; but it is of no importance to anyone else. When we consider the position of dentistry, and our position as dentists, in this country, and how much labor and money is needed to elevate the profession out of its present deplorable condition, the fact that the men who got these names on the register appear to have so little comprehension of the true wants of the profession, that they are now calling for a lavish contribution of money to be spent in an attempt, which would be almost certain to prove abortive, to have a portion of them removed; and, assuming that this effort is the one great need for dental organization and expenditure, and to be the most important scheme that can be devised for elevating the profession, is a commentary on the folly of entrusting them with any money, and evidence of their inability to understand what elevates and what degrades; whose bitter sarcasms no pen, even if wielded by the conjoined spirits of Swift and Thackeray, could possibly

rival. I will not spoil the subject by any words of mine, but will let the reader, in whom monopoly has not driven out all common sense, judge for himself.

But charity suggests that, after all, there is no such intention as it professed; and there is a good deal of both direct and indirect evidence to support the inference that the industry of the promoters of the British Dental Association may be explained on principles more in harmony with their general proceedings, and more in accordance with the state of the society funds. If the power was equal to the desire, undoubtedly there would be done a deed of dreadful note; but there is the rub, the power is not forthcoming. We know that men do not work except for an object of some sort. At the second Manchester meeting the secretary of the British Dental Association revealed the state of its finances, which precludes all reasonable hope of any serious effort being made through its instrumentality to carry out its avowed object. It is true this gentleman stated at that meeting, that he hoped the branch association would do better than the parent society, but the Manchester meeting gave no encouragment in that direction. It is also true that he tells us "we hope soon to give ample employment to the committee which the council have appointed for the elimination of names from the dental register."

Evidently conscious of the absurdity of such a statement after having revealed the impecuniosity of the exchequer, he says: "I do not say that if we be driven to legal proceedings, the necessary funds will not be forthcoming from one quarter or another, but it is not fair to throw all the burden on a few; besides, these men can not always act with us." Who are "these men," the "few" with purses so plethoric that they are ready to spend their money on such a cause, provided the profession refuses to respond to the call? Is this idle talk or an unintentional revelation of the interior workings of the clique who manage this agitation? Is there really a reserve reform guard? If so, the profession will be pleased to see them on parade.

If the funds of the British Dental Association prevent the carrying out of its apparent object, what can be the meaning of its continued existence? And what can be the objects to be gained, if not the ostensible one, by all this parade by an organization that

has neither scientific aspirations or the funds necessary for its avowed intentions? Is it continued on upon the principle of the campaign of the King of France, who marched his army up a hill, and then marched them down again? It is difficult to deal with men who revel in the sort of thing we are investigating, for the moment the subject is approached, you are assured you do not quite appreciate their views and actions, or they are strangely misunderstood, or are misrepresented; whereas the real complaint is they are perfectly well understood and thoroughly appreciated.

It was revealed at the last Manchester meeting that in harmony with and as a sequence to previous proceedings the men who have managed to secure the license which is miscalled a qualification are going to put themselves forward as the especially qualified dentists, although, as I have before intimated, they are by no means the elite of the profession in England, but quite the reverse; for a great stress was laid on the possession of the L. D. S. at this meeting; and to show how the D. D. S. is to be regarded, a gentleman present who holds that degree, was insultingly told, "You are not a qualified practitioner." Here is one purpose the British Dental Association may be made to serve. Again, all societies must have officers, and it looks well in the local papers to see the names of the president, vice-president, secretary and members of the council and so-forth with the coveted letters attached to each name, and it helps to carry out the first named purpose, while it is getting a useful and gratuitous advertisement, without the appearance of advertising. Furthermore, as no scientific matter is to be discussed, no one is called upon to reveal the gulf between the real quality of the license and the attainments it is supposed to guarantee.

Without doubt, earnest minds, who are only bent on realities, will, like the pure Desdemona, in their innocence, think there are no such men as the promoters and workers of the British Dental Association, and this makes the task of giving a faithful picture somewhat difficult.

Therefore, lest it be thought I am hypercritical, let me point out how easily a great deal more than all the promoters of this society dare to hope for, even had the profession been willing to see its money expended in so useless and undignified a manner, can be accomplished with a small outlay of time, labor and money, and so

as to be agreeable to all concerned; provided, of course, anyone is really in earnest in wishing to see the names, or a part of them, of the chemist-dentists removed from the register. The plan would be to form an organization with a modest and appropriate name, say the Dentists' Union, or Trade Protection Society, or something equivalent, so as to avoid the pretentiousness that has made the British Dental Association so ridiculous. When a small sum of money had been contributed, there should be printed a sufficient number of copies of the Act of Parliament to furnish one to all the chemist-dentists. Together with this should be sent a circular calling attention to the words of the Act, and pointing out that the necessity for their registration on the Dental Register was quite a mistake; that they ought not to have taken the threats of certain of the reformers in earnest, for it was only their way of airing their importance; and that it will be seen, by reading the Act, that it does not prevent any man extracting, cleaning and filling teeth, or making false ones, and being paid for it. All that it says, is that no one shall call himself *a dentist*, unless he is on the dental register, a title but few of these men have ever assumed, or wish to assume.

Having made this clear, then say that any person who has registered as "in practice with Pharmacy," can have his money returned upon condition that he applies to the Registrar to have his name removed from the register. There can be no doubt that a large number of the chemist-dentists would avail themselves of this opportunity to get back their money on such terms. When it was represented to the Medical Council that their registration had been a mistake, there is no doubt that body ought, in common fairness, to refund the money; and all the expenses of the dentists' organization would in that case be in printing the above named circulars and some forms of application to the Registrar, the necessary correspondence, and a few other incidental expenses. Thus would be effected a reduction of the register at the cost, to the profession, of a few pounds, little labor and without any bad feeling; and the money which the British Dental Association is apparently so anxious to worse than waste would be available for those purposes its promoters have never appeared to consider in the slightest degree necessary.

To give men qualifications by Act of Parliament is what they seem to think is requisite to make a man a dentist, and to elevate the profession. But, supposing the council should say, in effect, "If there was any mistake it is your own doings and your own affairs; we will remove the name of any person who applies, but now that we have the money we shall keep it," it would be a practical and mortifying illustration of the astonishing folly of placing us, as though we were what Mr. John Bright once called the *residuum* of society, unfit to be entrusted with self-government, under the control of a body which takes our money and is not responsible to us for its disbursement, and has the right to declare who shall and shall not be on our own register, with nothing left but humble representations, or still more humble protests. And if there is anyone who requires evidence, it ought to be overwhelming proof of the hopelessness of expecting any real dental reform until the profession has acquired enough confidence in itself to take entirely independent action and manage its own affairs. But even in case the council should refuse to refund the registration fees, the removal of a part, at least, of the chemist-dentists can still be accomplished at once, and by a fraction of the sum the British Dental Association would squander to little or no purpose after years of labor, excitement and litigation, provided the profession should think it worth while to furnish the several thousands of pounds that might be necessary to pay the two pounds ten shillings—the cost of registration—to every applicant who was willing to be removed. But if the profession should decline to furnish a general fund for such a purpose, as I have no doubt it would, there is yet another plan left that might be tried—always assuming that some one was desperately in earnest in this matter. By reference to the register is can be ascertained, for every man's address is given, who are the dentists nearest to the applicant that is willing to have his name removed upon condition he receives back his money

Let a number of these men—say the four who are nearest—be notified that he has made such an application, and be asked to contribute the few shillings necessary, when divided among so many, to return his registration fee. If those supposed to be the most interested in each particular case should refuse to contribute for the removal of that name, and the profession should prefer to see its

money spent in something more sensible, and the men whose folly is the cause of this agitation should find their wisdom when left to bear all the expenses, it will be clear that no one really cares a pin about the presence of the chemist-dentists on the register—which, I suspect, is the real truth. It is difficult to maintain a serious tone in dealing with such an absurd scheme as the spending of a large sum to get up a dental register with two-fifths of the names on it those of men who are not dentists, and then spending a vast deal more to get them off again, especially at a time when all the energies of the profession are so urgently demanded for legitimate purposes. Yet I think it will be seen that if anything serious is to be got out of it, I have sketched the only feasible plan. And now that a simple way is shown how that which the British Dental Association professes to have in view can be accomplished, and a great deal more, and as it stands confessed impotent for want of funds, any further agitation by that greatest, as well as smallest, of dental pretenses will leave little doubt that its real aims differ somewhat from its avowed object.

It may be possible, however, that the two may be brought into somewhat more harmony by the necessity to resume the work it had to perform when known as the reform Committee, on account of the determined opposition of the "surgeons practicing as dentists," who have declared through their president the existence of the civil war among the dentists which miscalled Reform was certain to bring about. But if the surgeons can see their way to act with wisdom and justice — and, in this matter, wisdom is justice and justice is wisdom—they will carry the profession so entirely with them that the British Dental Association will have neither funds nor following.

THERAPEUTICAL TREATMENT OF THE DENTAL PULP.

BY A. F. M'LAIN, M. D., D. D. S.

Of the various pathological conditions which may arise in the *teeth*, none are more difficult to combat successfully, and which

require a more intimate knowledge of the power of therapeutical agents, than those having their origin in the *dentinal pulp*.

These bodies are subject to irritation from various causes growing out of certain circumstances, as accidents, changes in temperature, and from that most common cause, *decay* of the teeth.

The effect of irritation to the pulp, if not met therapeutically at its earlier stage, ultimately leads to congestion and inflammation of that organ, thereby producing its death; and, by the continuance of these pathological states, disease is finally communicated to the peridental membrane.

Now, the irritation, congestion, or inflammation of pulps, caused by mechanical shocks, fractures, abrasion of the dentinal tubuli, changes of temperature or from the rapid progress of decay, permitting chemical action on the pulp tissues, are to be treated by different medicinal means, adapted to each case.

Congestion or *inflammation* having its origin in shocks, fractures or abrasion, is not, according to the writer's experience, amenable to conservative treatment. In such cases, no alternative remaining, the better course is to proceed to devitalize and extirpate, concluding the operation in the usual manner of root and crown filling. The chances, however, for preserving pulps alive in such cases are small; and is successful only when the irritation is of a slight character, and when its origin has been due to gradual exposure, during the progress of which the vital forces have been able, by throwing out lymph, to protect, in a measure, the pulp from the effects of external agents. On the other hand, when the solution of the tooth substance is rapid, and the pulp becoming suddenly exposed, the amount of irritation which follows, soon brings about that hyperæmic condition, known as congestion, whereby more blood is thrown into the pulp cavity than is natural; and that surplus blood, not finding an exit into the general circulation, produces so much pressure as to strangulate and cause the pulp to lose its vitality. The consequences of this last do not stop here, for if not relieved at this stage, decomposition and liquefaction of pulp tissues ensue, causing a development of gases which, together with the decomposed matters, force themselves through the apical foramen, and there coming in contact with the pericemental or peridental membrane, set up anew the phenomena of congestive inflammation, and

thus pave the way to the usual concomitants of that pathological condition, viz: alveolar abscess, necrosis, etc. The application suddenly of cold to the teeth acts in the same manner and with like results. This frequently occurs from contact of ice-cold water, the effect of which first drives the blood inward, in short, inducing an intropulsive movement of the hæmal current, but which is soon followed by a reflux action which fills to repletion the nuerohæmal sheath, thereby establishing a regular *stasis* with the usual phenomena and consequences of congestion.

A slight congestion of the pulp is, however, sometimes removed by a gentle puncture of the pulp, through a carious opening in order to evacuate the excess of blood and should this fail, tepid water taken into the mouth or a stimulating wash may succeed in bringing about the desired end; for warmth, it is well known, acts beneficially in congestion by giving force to the arterial current and in that way sweeps the stagnant venous fluids into the general circulation. Resort may be had also to local blood-letting from the vicinity of the affected tooth, which acts very happily at times. A blister on the gum may be tried with propriety; but if immediate relief does not follow these several modes of medication, the vitality of the pulp is pretty sure to succumb, even though the hyperæmic state had not lasted but a few hours. In speaking of local bleeding, the preference should be given to leeching, as by that process the unloading of vessels in the immediate vicinity of those connected with the affected pulp, is accomplished without leaving much irritation behind. When an inflammatory process exists of a moderate degree, and limited merely to the exposed portion of the pulp, the prognosis, as regards the preservation of its vitality, is more favorble, as the effusion into the pulp cavity is small in quantity, and, the character of the exuded fluids being endowed with powers of organization, the *vis-conservatrix* is often able to limit the evil effects of inflammation; and, even should this effort of nature fail, the pulp organ may still be within curative means.

To obtain so desirable an effect, sedative applications should be made directly to the pulp and to the surrounding parts, with the view of lessening the arterial supply, and to allow nature to resume her sway. For this purpose the strong preparation of aconite, combined with suitable agents, will frequently act most beneficially.

Thus, an irritably inflamed pulp will often be immediately relieved on applying a mixture consisting of equal parts of Fleming's tinct. of aconite and chloroform, with one-half their proportion of the aquæous solution of iodine, (Lugol's weak solution), to which may be added fifteen or twenty drops of pure creosote or carbolic acid. It is an error to flood a pulp which is not intended to be devitalized, with creosote or carbolic acid in full strength, as is commonly practiced. Although both of these solutions possess anodyne properties, yet, in an undiluted state, they are escharotic, and therefore will prove irritating, and thus aggravate the symptoms. An application or dressing of the preceding formula having been made, the gums may be painted with a solution of equal parts of the strong tinctures of aconite and iodine. A counter-irritant, as well as resolvent action, is thereby obtained. Now, if the pulp is inclined to bleed, this should be encouraged by holding tepid water in the mouth, or by syringing the cavity with it; and when the hemorrhage has ceased the preceding anodyne dressing is then applied, and the cavity sealed with a solution of gum sandarac or mastic varnish on a pledget of cotton lint. Sometimes it happens that the pain continues; especially is this the case when it proceeds from an acid condition of the fluids entering the cavity, or from previous fermentation having taken place in it; then an alkaline dressing of liquor potassæ or sodæ, with a little essence of peppermint or tincture of camphor may afford instant relief. A solution of chloral in camphor, combined with belladonna or aconite, answers an excellent purpose as a neutralizer. In fact, nearly all the essential oils will sometimes relieve toothache arising from irritated or inflamed pulps.

If by any of the means mentioned, the partial inflammation of a pulp has been subdued, something still remains to be done in order to preserve its vitality. And the benefit, nay, the absolute necessity which exists for the conservation of the entire vitality of a tooth, as regards its proper nutrition and natural appearance, to say nothing of the gradual deterioration which inevitably befalls a crown when the neuro-hæmal connection of a tooth has been injured or destroyed, is too well understood by you, Mr. President and gentlemen of the association, to need an elucidation here. Neither is it necessary to enter into a disquisition in regard to peridental trouble, alveolar ab-

scesses, etc., which so often supervene upon the ulceration and the putrefaction of pulps, when such a course has been allowed to take place.

To digress a little. Many writers and lecturers on this subject assume, with a positiveness not to be contradicted, that pulps in almost every state of disease, from inflammation and ulceration up to partial gangrene, can be saved alive by proper medication. Now, this is contrary to the experience of every unbiased observer, for it will be found that, with the utmost care in the management of the case and despite most thorough therapeutical appliances, a pulp that has once been the subject of extended inflammation or in any way in an ulcerated condition, invariably dies sooner or later, causing more or less subsequent disturbance. To resume: As we have intimated, the conservative treatment of a pulp is only half accomplished on arresting the irritation consequent upon exposure. It is essentially necessary to shield it from the contact of air, moisture, and all extraneous exciting matters, else a recurrence of the same condition would ensue and thus render future efforts at preservation unavailing.

It is now admitted, that pulps, if properly covered or protected, and under favorable circumstances, and in well constituted organs and temperaments, especially in those cases where irritability is slight, or when the pulp has become exposed from the mechanical removal of caries, at least ninety-five per cent can be saved, with all their vitality. To obtain this result, some non-conducting material, and which at the same time is perfectly congenial to it, must be interposed between the exposed or sensitive pulp and the filling, and so adapted as to prevent pressure upon the pulp, as well as leave no space for the retention of air, or for the accumulation of exudation fluids that might escape from the pulp. To these very causes may be attributed the common failures which formerly attended the capping of pulps, when solid substances, such as gold caps, horn, lead, asbestos, etc., were employed for that purpose. The vacuum thus left, allowed serum, lymph, blood, or atmospheric air to accumulate or remain in contact with the pulp, and by that means caused continued irritation, which finally brought about its dissolution. Flooding the cavity with creosote or carbolic acid, and then coating the surface with oxychloride of zinc cement, often

fails of its purpose, because the caustic effect of the hydrochloric acid contained therein is apt to irritate, and finally devitalize the pulp, notwithstanding the film of coagulated albumen or fibrine that may have been formed through the action of the creosote or carbolic acid upon the exuded plasma, for which they have an affinity.

Now, this protecting layer may be more readily and perfectly formed artificially, by applying collodion to the exposed surface; but better still, by painting it over with a solution of Hill's stopping or gutta-percha, which is obtained by dissolving either one of them in chloroform, into a thin paste. In applying it, the cavity is to be well dried, and kept so; but previous to which, it should be bathed with the anodyne mixture previously mentioned; then, with a pointed stick, or fine excavator, armed with cotton lint, spread the solution of Hill's stopping over the exposed pulp or sensitive dentine, care being observed to remove any portion of this coating that might appear on the parieties of the cavity. It may be necessary, according to the extent of the exposure and thinness of the solution to repeat the application several times in order to obtain a sufficient thickness of body to prevent the penetration to the pulp of the chloride of zinc, which would cause pain. But it will be found by proper management, that in almost every case of exposed pulps, no pain will follow the introduction of oxychloride of zinc. After the introduction of Hill's stopping, sufficient time should be given for the evaporation of the chloroform, and for the film thus formed, to obtain some degree of firmness, before spreading the oxychloride of zinc; and then, when a crust from the latter has become hard enough, a permanent filling may be introduced; or, if the exigences of the case require it, the cavity might be filled up entirely with the oxychloride, to serve as a temporary stopping.

Perfect dryness of surface being an essential pre-requisite for the successful application and cohesion of the Hill's stopping, the rubber dam becomes an all important factor in the process. Furthermore, the permanency of the film thus formed, as well as its non-conducting properties, are greatly enhanced, by adding to the solution a small portion of pulverized silex.

Frequently, in cases of slight exposure, or nearly exposed pulps, particularly if of recent occurrence through accidental means, and

when no previous irritation or inflammation had existed, the oxy-chloride covering may be dispensed with entirely, on the application of the other. On the other hand, when the double capping has become necessary in consequence of greater exposure, but the conditions of the pulp, being equally as favorable for an operation, scarcely any risk is incurred in the immediate insertion of the permanent filling. It is natural to infer, however, that those cases wherein the pathological states of the pulp are such as to render its future preservation doubtful, prudence would dictate to the operator the propriety of merely inserting a temporary filling, after having properly protected in the manner just indicated, the sensitive or exposed pulp, with a view of awaiting future developments as regards its survival of, or its having succumbed to the morbid impressions to which it has been subjected.

Now, having detailed the mechanical means, and also the therapeutical measures, adaptable for the preservation of the vitality of exposed or irritable dentinal pulps, it will not be inappropriate on this occasion, to say something in reference to the treatment of those pathological conditions which result so frequently from the dissolution by disease of these delicate organs.

They comprise alveolar abscesses, peridontitis, or otherwise pericementis, exodontitis, including pulp ossification, and necrosis.

To appreciate fully the nature of such departures from health in the dental organs, it may be as well for us to examine into their etiology in order that the more rational, and therefore more applicable modes of treatment may be clearly established.

In the first place, any irritant, whether chemical, or mechanical, or vital, if applied to sentient parts, produces a disturbance in the circulation of that part. On its first application, a rush of blood takes place; in other words, a determination occurs; the artery is seen to dilate and become distended with sanguinous fluids, but it soon subsides if the irritant be withdrawn. But on continuing the irritation, the veins at and near this point manifest a tendency to become obstructed, the motion of the blood begins to flag, and if not renewed, the circulation in the part ceases entirely. The phenomena just described being the common attendant of congestive hyperæmia, regardless of location, it can be readily apprehended that a

precisely similar course follows in the vessel of a pulp; but in this state of hyperæmia, the artery being free to act from the *vis-a-tergo* force of the heart, continues to propel more blood through its channel into the pulp cavity; and the mechanical impediment naturally offered to its flow into the venous opening, soon fills to repletion the whole bony canal of the tooth, and thus produces so strong a pressure upon the vessels and pulp substance as to lead to the strangulation, and ultimately to the death of this organ.

Now, when that other and more complicated form of hyperæmia —inflammation, occurs, though located in the arteries, and arising from the same cause—over-stimulation, with the concomitants of over-distension, venous obstruction, stagnation, varying, however, in their order of progress and phenomenal aspects, as just remarked, one being passive, and the other active, and producing somewhat different results when occurring in other textures, yet in the dental organs their pathological sequences are, in the main, nearly identical. The reason is obvious In a healthy or physiological condition, the artery and vein entering the tooth through a *constringed* apical foramen, and all being enclosed in a common sheath, with the nerve, they gradually expand at the bulbous portion of the pulp; and the blood of the artery, after depositing its plastic nourishment in the crown of a tooth, returns freighted with the waste materials into the vein, in order to be conveyed back into the heart and lungs for subsequent æration and revivification.

The apparent analogy between *passive* and *active* hyperæmia, as shown in the dental organs, may be appreciated by instituting an examination into the phenomenal action with their dissimilitudes as they occur in the hard and the soft tissues. These, being endowed with expansive powers, the excess of blood propelled into the vessels during the determinative stage, finds a vent through enlarged openings, made so by the over-stretched fibrous net work, of which their channel walls are formed, thus affording a partial relief, by the exudation of the serous portions of the blood into the surrounding tissue. But a pulp, being enclosed in a dense, unyielding, bony structure, an irritation induces an afflux of blood into its vessels, which so chokes up the canal, that the excess of sanguinous fluids, finding no exit, soon produces obstruction, stagnation, pressure, etc., the characteristic concomitants of congestion, which finally leads to the complete destruction of the *neuro-hæmal* tissues.

Viewed pathologically, congestion and inflammation, as regards their origin and results, their dissimilitude is rendered quite perceptible, as we have already had occasion to notice. They are both preceded by determination, but have their origin from different locations. *Congestion* begins in the capillaries or veins; whilst *inflammation* arises from arteries; though one or the other may occur, according to the strength of the irritant, or the length of its duration.

This has been repeatedly demonstrated under the microscope, by applying to the web of a frog's foot, a solution of capsicum, when immediately the blood was seen rushing toward the irritated point, the arteries becoming dilated, and the capillaries of the point red, and greatly distended. Here was the determinative stage. On continuing the stimulation, though the arterial current had not ceased, yet its motion became somewhat retarded; the capillary tubes were observed to become more and more distended, with a darker red appearance, whilst the blood-corpuscles lost their disc-like form, and were seen as elongated spheres, worming themselves along, which imparted an oscillatory or vibratory motion to local excess of sanguinous fluids. The inflammatory stage was here displayed in its incipiency. But by increasing the strength of the irritant, or by prolonging its action still further, the veins became completely distended and obstructed, arresting the motion of blood in the capillaries, and giving the part a blue or purplish color. A fully developed congestion was here shown. Now, what is the usual result of such hyperæmic effusion? The delicate membrane forming the channel walls of those small hair vessels, from their over-distension, naturally stretch; their fibres separate, and the serous fluids of the blood ooze through into the adjacent textures. These fluids being thus strained, as it were, of most of their organizable properties, and losing still further their vitality by their long retention in the part, naturally decompose; and in so doing, the textures thus encroached upon, undergo atropic softening, which prepares the way for formation of abscesses.

The products of congestion, being, as we have shown, devoid of the powers of organization, by reason of their source (venous and capillary systems), and from the degenerating process to which they have been subjected, readily accounts for the non-production of hypertrophies. And, on the other hand, it is

equally apparent why a moderate degree of inflammation is more liable to become organized than the other, the effusions it furnishes, coming as they do, immediately from the arterial system, are freighted with plastic properties; hence, has a greater tendency to the formation of organized growths. But an inflammatory turgescence may be so strong as to cause so copious an influx of blood or lymph to the part, as to produce all the phenomena and sequences yielded by congestion.

Viewed on general principles, the phenomenal characteristics peculiar to these two forms of hyperæmia are sufficiently distinctive and well marked, as regards their occurrence in the system at large, to be readily apprehended, and, it is equally well understood, that one or the other might occur, or follow each other according to the amount of stimulation brought to bear upon the part; but in the dental organs, whose dense, inelastic structure and corresponding want of absorptive powers, in case of serous effusions upon the pulp, as generally takes place in the soft textures, naturally communicates in such an abnormal condition of it, features pertaining to both processes, so that the term *congestive-inflammation* would not be inaptly applied. Consequently, an irritation of the pulp of much severity commonly assumes this double type; and if not soon removed, ends in the death and subsequent decomposition of the pulp tissues. The products—pus or gas, thus yielded, finding their way through the apical foramen they come in contact with the pericemental membrane, which is in its turn irritated, and thus renews the congestive or inflammatory act, which leads, if not subdued, to the formation of *alveolar abscess* and eventually to *necrosis* of the roots.

Now, should the inflammatory congestion of a pulp be of a mild or sub-acute character, the foramenal infiltration is apt to be slight; hence, the morbid process becomes limited, to the end of the root, where a portion of the pericemental membrane detaches itself, and assumes a pouch-like form, which, from a wise provision of Nature, serves as a barrier to the extension of the irritation. Frequently, the *vis-conservatrix* forces, in thus limiting the morbid process, by the formation of a receptacle for these acrid matters, gives vent to them by means of a fistulous opening in the vicinity of the root affected. Relief is thus afforded for a time, but ultimately the perice-

mental membrane loses its vitality, and then *necrosis* of the root or roots necessarily supervenes, with a probable similar implication of the alveolar processes, if the roots be allowed to remain.

It sometimes happens an inflammation of a pulp is of so simple and mild a character that only a moderate amount of exudation takes place, and which being rich in plastic materials, a deposition of secondary dentine occurs in the pulp chamber, or if the irritation extended to the peridental membrane, the ossific deposit is made on the root or roots, which is then termed *exostosis*.

In treating the consequences of dead pulps, the therapeutical indications are obviously to remove them where it is possible before their decomposition has commenced; if in the inflammatory stage, it should be subdued by the introduction of anodynes and sedatives. These consist of aconite, chloroform, creosote, or carbolic acid, morphia, etc. When the inflammation has reached the pericemental membrane, an application to the gum of equal parts of the tincture of aconite and iodine will sometimes suffice to remove the difficulty. Should this fail, resort may be had with excellent effect to blistering, which is done by means of cantharidal collodion, or with strong aqua ammonia. But when the hyperæmia has assumed the congestive form then leeching the gums will prove serviceable. This mode of abstracting blood should be adopted after the establishment of the congestive stage, as an encouragement to the afflux of blood to the part already too great, during the determination or in the initiatory steps of inflammation, would be given and thus aggravate the evil. It is, however, well to remark that the existence of such hyperæmic state several hours consecutively indicates with certainty that the inflammation has passed into congestion, for the reason already given in reference to the complications so apt to occur in hyperæmic conditions of the pulp or teeth.

Warmth and stimulants, within proper bounds, be it understood, are most valuable therapeutical agents for the treatment of congestion. They act by expanding the arterial trunks, thus giving an impetus to the stagnant fluids which sweep them back into the general circulation. On the other hand, cold applications, frequently renewed, often prove beneficial, as by their constringing effect on the vessels a determination of blood is moderated, thus allowing the circulation in the part to regain its equilibrium, by which means a

resolution is promoted, or an incipient inflammation prevented. Heat and cold are therefore merely relative terms. They are both sedative as well as stimulant, but inversely, according to the manner in which they are employed. To gain, for instance, a sedative effect from cold, its application must be persistently continued, and this is obtained by frequent repetition, else the blood that has been repelled at first, by the contraction of vessels which it causes, soon surges back, hence, instead of acting as a sedative it becomes a stimulant, thus increasing the hyperæmic difficulty. It is therefore very evident that cold can be made either stimulating through its intensity and transitory application, or sedative by a persistent, non-intermitting course.

Should the inflammatory congestion have reached such a point as to threaten a termination into alveolar abscess, the abstraction of blood becomes an immediate necessity. Leeching is preferable to scarification, as the lancet does not deplete sufficiently, besides increases the irritation through the wound it makes. On the formation of an abscess, however, a free incision should be made into it, in order to relieve the distension and consequent pressure caused by the exudation that has taken place in the parts. At the same time, the pulp chamber and root canals require to be thoroughly cleared of all decomposed or decomposable matters, such as portions of the pulp, blood, pus or any other irritating foreign substances that may be therein. After this the cavity should be well syringed out with tepid water and a dressing of chloroform, aconite, iodine, (aqueous solution,) and carbolic acid or creosote, introduced on a lock of cotton placed loosely in the pulp chamber. This is particularly necessary if pain exists, as by sealing the cavity the secretions and gases that might form in the tooth would find no escape, and in that way increase the pressure and, consequently, also the pain. Otherwise some covering may be placed over the application with the view of preventing the remedies from being too much diluted or washed out by the secretions of the mouth. These dressings should be changed at first daily, then every other day, and finally once a week, until all abnormal symtoms have disappeared. An obstinate abscess may require from ten days to two months or more to be effectually subdued.

Should a serous opening exist in the gum, near the root of the af-

fected tooth, the preparatory treatment need not continue more than a few days; long enough, however, for the cleansing of all extraneous matters from the pulp chamber and root canals, and otherwise disinfecting them, when a permanent filling could be introduced with little danger as to consequences, as the vent is thus afforded for the escape of gas or pus, which perchance might be generated in the tooth, thus preventing the evil sequelæ so apt to result from pent-up secretions. The remedies used in treating alveolar abscesses may be a little more concentrated than those employed in inflamed or irritable pulps, but it is not inappropriate in this place to reiterate that the application in any case of creosote or carbolic acid in full strength, should be deprecated, especially as is practiced by many, of forcing it through the apical foramen. The escharotic nature of either of these agents cannot act otherwise than to excoriate the already diseased peridental membrane. Sometimes the introduction of carvacrol, in connection with those anodyne or sedative articles already named, will act very efficiently in causing a cessation in the discharge from an abscessed tooth. Occasionally much good is derived from varying the remedies, by substituting tincture belladonna, essence of peppermint, or tincture of camphor in the place of carbolic acid, creosote, etc. Again, camphor, chloral or salicylic acid may be tried, although the last has never proven very satisfactory in the hands of the author of this paper.

When the discharge is persistent, failing to respond to the preceding modes of medication, diluted aromatic sulphuric acid, introduced on a probe armed with cotton lint, through the carious opening, acts very efficiently at times. The same agent may be applied also at the apex of the root by means of a perforation made through the gum and alveolar process. Here it is that Farrar's alveolar-abscess syringe is applicable. Chloride of zinc can be used in the same way, and by injection through the pulp cavity, for indolent abscesses, with the view of breaking up the pyogenic membrane, lining the sac of the abscess, and also as a stimulant for the promotion of a healthful action in the part.

Nitrate of silver would perhaps prove equally serviceable were it not for the objectionable and inevitable coloration of the tooth it produces when so employed. Surgeons, it is well known, frequently cure most intractable caries of bones with this agent. At all events,

nitrate of silver, as well as sulphuric acid or chloride of zinc, may be employed in the treatment of alveolar abscesses, without the danger of coloring a tooth, if it be introduced hypodermically, or through a fistulous opening. Again an abscess which does not respond to treatment by frequent dressings, is sometimes thoroughly healed by applying *the* appropriate remedies to the pulp cavity, and afterward inserting a temporary filling, which may be left in for some length of time for the purpose of permitting the recuperative forces to have full play. When, at length, a cure is thought to be effected, and if on opening the cavity, no odor or any secretions appear, a permanent filling may be made without apprehending any evil result therefrom.

The remedial measures to be employed in fully established *exodontosis* is *nil* as regards a cure, further than the extraction of the affected tooth. Prevention, if possible, would seem to be the only rational mode of procedure in the early symptoms of the disease. And as this pathological state arises from a sub-acute form of peridental inflammation, or sometimes from a rheumatic predisposition to peridental irritation, which excites hypertrophic action, prompt antiphlogistic measures, such as leeching, blistering and the application to the gum of discutients, might perhaps avert the occurrence of this malady.

Ossification of pulps, when suspected, and having an origin through irritation caused by dental decay, their extirpation, preceding the proper operation of filling, is about the best and surest remedy in such cases. For *necrosis*, of course, the roots having lost their vitality and thus become foreign bodies, the extraction of teeth thus affected is obviously a prime necessity.

JOURNALISTIC.

In the "American Journal of Medical Science," for February, we find a review by Prof. J. B. Hodgkin, of an article "On Affections of the Ear Arising from Diseases of the Teeth," contributed to a medical journal by S. Sexton, M. D. The reviewer arose from the reading of the article "with the conviction that a medical man is not fully competent to criticise the work or the methods of den-

tistry"—a conviction shared by not a few of his professional co-laborers. Dr. Sexton says: "I shall only allude here to those *known* to be injurious, premising, however, that future investigation may, in throwing more light upon the subject, determine that other fillings are inimical to health." He then pitches into amalgam, and, with little or no particular effort, finds it "established" "that toxic effects may result from wearing these fillings in the teeth."

If the author, who is an anti-amalgamite, without exactly knowing why, were to revise his contribution, he might greatly improve this particular part of it by quoting entire pages 447-8-9 of Piggot's "Chemistry and Metallurgy," where the amalgam question is discussed in a manner that can hardly fail to meet the approval of all of his way of thinking. To be sure these pages were written thirty years ago, but thirty years is no drawback to those who think and act as one who has "made up his mind."

Vulcanite also comes in for its share of abuse. Plates of this material are guilty of "yielding a poison," and the soft parts in contact with them "are often bathed in pus." Such plates are said to "cause nausea, vomiting, and purging, with stomach painful to the touch, the symptoms increasing in severity from day to day, the mouth swollen, sensitive, feverish," etc. We wonder at Prof. Hodgkin's patience in reading the article, and still more so at his careful consideration of it. He concludes his review with the remark, "all this is very curious, to say the least." We think so, too. As the girl said, "its too funny for anything."

The "Independent Practitioner" for February contains one dental article, "Every Tooth Containing a Metallic Filling is a Galvanic Battery," etc., by Dr. H. S. Chase. It sets forth, presumably for the benefit of the medical readers of the "Journal," some of the teachings of the new departure. He complains that "the utter ignorance of this subject displayed in the productions of nearly all the writers against the new departure is truly lamentable."

This number also contains "A Letter of Individual Importance to Every One Interested in Dentistry," signed by Dr. Wilkerson, junior editor and proprietor of the "Journal." He says: "*I earnestly request* that you send me your printed or plainly written professional card, containing your full address, with degrees, titles and honors.

The reader is also requested to name his native tongue, and the languages he is conversant with, the colleges or institutions he has attended, the societies he is a member of, and what offices he has held in either." All this is wanted for "A Directory, History and Biography of the Dentistry of the World."

Now, while the publication of such a work may be well enough, one is at a loss to know of what profitable consequence it can be to the reader to be told that John Smith, M. D., D. D. S., A. S. S., Dentist to King Muck-a-muck, and Counselor to her Majesty the Grand High-up, Knight of the Well-filled Stocking, etc., speaks English, is conversant with French and German, is a graduate of Neophogia college, a member of the Crazy Hill Dental Association, and has served one term as Vice-President of the same. It may, we repeat, be well enough to publish all this, but what of it—what use?

Further on the reader is told that "all subscribers who send in their money before November 1, 1880, will have their names in heavy letters, which names will generally be selected as liberal persons." That is, those who do not so send their cash will not find their record in heavy type, which fact will brand them as illiberal, or to be exact, as not liberal. This heavy-letter inducement is one that few quacks can let pass by. We are almost ready to guarantee the proprietor a big installment of names of such, with degrees, titles, and honors, without end, as members of this class are usually "well heeled," and consequently abundantly able to purchase a record which is vouchsafed others only after years of hard work. L.

EFFECTS OF BREATHING NOXIOUS VAPORS.—In some experiments lately made by M. Poincare, on the effects of poisoning by sulphide of carbon, he often found in the blood-vessels drops, apparently of this substance, condensed anew after absorption by the lungs. Still, the great volatility of the substance rendered this improbable *a priori*, and, as he had not succeeded in chemically determining what the drops were, he hesitated to express the view referred to. He has since obtained like results with other substances not miscible with blood, and which are much less volatile than sulphide of carbon, especially spirit of turpentine and nitro-benzine.

The chemical determination, indeed, was as difficult as before; but, from the fact that it was only in animals that had respired those vapors that free drops had been found in the circulation looking exactly like the substances furnishing the vapors, he thinks the matter worthy of attention. Workmen who respire vapors of this kind are evidently exposed to a poisonous action, variable with the vapor's composition, and also to mechanical disturbances of the circulation and nutrition, similar to those produced by embolia and the introduction of air into the veins. Thus may probably be explained the sudden deaths observed in the course of experiment with those substances; and perhaps certain fatal results from taking chloroform have been due to the same cause The drops in question, found in nearly all the organs, are specially abundant in the liver, kidneys and lungs.

AMERICAN DENTAL ASSOCIATION.

The American Dental Association will hold its twentieth annual session August 3, 4, 5, and 6, 1880, at the Hall of the Massachusetts Institute of Technology, Boston, Mass. Hotel accommodations have been provided at the "Brunswick," Boylston, corner of Clarendon Street, opposite the Institute. Rate, $3.00 per day, reduced from $4 50. This hotel is new and first-class in every appointment. The hotel and hall are in near proximity to the business part of the city, yet free from the noise and turmoil necessarily incident to the business streets. The Committee of Arrangements feel sure they will be able to provide opportunities to make the stay of the members pleasant, and the meetings of the Association profitable.

THOS FILLEBROWN,
Chairman 1st Div. Ex. Com.

NOTICE!

The Transactions of the American Dental Association for 1879, a volume of 134 pages, can be had post paid by addressing Dr. Geo. H. Cushing, Secretary, 34 Monroe Street, Chicago, Ill., and enclosing $1.25.

THE MISSOURI

DENTAL JOURNAL.

A Monthly Record of Dental Science and Art.

VOL. XII.—JULY, 1880.—NO. 7.

MINUTES OF TRANSACTIONS OF THE SIXTEENTH ANNUAL MEETING OF THE ILLINOIS STATE DENTAL SOCIETY.

BY EDMUND NOYES, Secretary.

OFFICERS 1880–81.

President	J. Frank Marriner	Ottawa.
Vice-President	J. A. W. Davis	Galesburg.
Secretary	Edmund Noyes	Chicago.
Treasurer	E. C. Stone	Galesburg.
Librarian	G. H. Harrington	Delavan.

OFFICERS 1879–80.

President	C. A. Kitchen	Rockford.
Vice-President	J. Frank Marriner	Ottawa.
Secretary	Edmund Noyes	Chicago.
Treasurer	E. C. Stone	Galesburg.
Librarian	G. H. Harrington	Delavan.

The Sixteenth Annual Meeting of the Illinois State Dental Society was held at Bloomington, on Tuesday, May 11th, 1880, and was called to order at 10 o'clock A. M. by the President, Dr. C. A. Kitchen, of Rockford.

After the calling of the roll of active members, and the acceptance of the published minutes of the last meeting, without reading, Mr. E. H. Rood, Esq., the mayor of Bloomington, welcomed the Society in the following address:

WELCOMING ADDRESS BY E. H. ROOD, ESQ., MAYOR OF BLOOMINGTON.

Gentlemen: I have the honor to appear before you this morning in behalf of those who love and appreciate true science and art, to bid you a hearty welcome to Bloomington.

It is almost within the memory of many of you that Dentistry has advanced to the rank of a distinct profession, and those who practice the art successfully are versed in the lore of your colleges, which are among the indispensable institutions of the country. The professors therein are students as well as teachers of Anatomy and Hygiene, and it is a distinguished honor to receive from them a diploma. The advice and counsel of the dental practitioner of to-day has value in many of the diseases that affect humanity.

Although as before remarked, Dentistry has not long been a distinct profession, yet the preservation and beauty of the teeth has received attention from the earliest periods. The ancient Egyptians appear to have practiced the art, artificial teeth of wood and ivory having been found in their tombs. It is also said that gold fillings have been found in the teeth of mummies. The natives of Hindostan, and the high caste Brahmins especially, are said to have the finest teeth of any people. Cleanliness with them is a matter of religion, and they spend an hour daily rubbing their teeth while at the same time they are performing their devotional exercises.

It may not be entirely uninteresting to all if I note a few of the steps which have led the practitioners of the art onward and upward to the proud position now occupied by the savans of the profession; although such information must necessarily have been obtained from sources open to all.

The works of Galen, written in the Second Century, contain the earliest treatise upon this art, and were recognized as the best until about the Fourteenth Century. About the year 1800 books began to multiply relating to Dentistry, and by 1825 it had advanced to the dignity of a Science.

The practice of this art was first introduced into the United States by a French soldier named Le Mair, during the Revolutionary War. In 1790 John Greenwood carved in ivory an entire set of teeth for General Washington. In 1820 the number of dentists in

the United States was about 100; ten years later there were about 300, only one-sixth of whom were properly instructed. In 1842 they numbered about 1,400, and in 1858, 4,000. The "American Journal and Library of Dental Science" was established in Baltimore in 1839, and the first society of dental surgeons in this country was soon after formed. About this time the State of Maryland established a college of Dental Surgery, "designed for instruction in the principles and mechanical practice of the art." In 1855 the National Convention of Dentists was organized and their first meeting was held in Philadelphia. The reports of this society have helped to disseminate a knowledge of important discoveries and improvements in this science.

The beautiful colored porcelain teeth now used show how great has been the advancement of the art since the time when they were carved from ivory, or made by altering the shape of the teeth of cattle, sheep, etc. Enameled teeth, though a French invention, owe their present perfection largely to the skill of American dentists; and in 1865 the product of nine manufactories, then established in the United States, was over two million teeth.

The improvement in fastening artificial teeth is also a noticeable one; from ligatures of flax and silk to atmospheric pressure is certainly a great step. In 1851, Dr. John Allen invented the Continuous Gum, and now politicians and others who have lost their cheek, can have the same restored by artificial process.

Gentlemen, may your deliberations tend to the advancement of true science, and be characterized by that harmony which results from kindred pursuits.

May your lives be free from corroding care, your characters enameled with christian graces, your homes be models of beauty and regularity, and your final reward a mansion in the city whose streets are paved with gold.

Dr. Crouse, being called upon by the President to respond for the Society, thanked the mayor and the people of Bloomington for their welcome, and said that he would promise good behavior on the part of the members of the Society, as "all of them are sober and well-behaved, except one or two, and those are kept in pretty good subjection; and we will be responsible for any damage they may do."

The roll of active members in good standing is as follows. Those

in italics having been present at the meeting, and those marked with an asterisk (*) having sent dues.

Antes, R. H., Geneseo,
Black, G. V., Jacksonville,
Brophy, T. W., Chicago.
Baldwin, C. V., Danville.
Baker, D. B., Quincy.
Cushing, G. H., Chicago.
Crouse, J. N., Chicago.
Campbell, J., Bloomington.
Call, E. B., Peoria.
Clark, A. B., Chicago.
Carpenter, G. T., Chicago.
Creswell, J. J., Galena.
Cormony, J. W., Mt. Carroll,
Dean, M. S., Chicago.
Davis, K. B., Springfield.
Dean, W. W., Lacon.
*Davis, E. F., Galesburg.
Davis, J. A. W., Galesburg.
David, E. B., Aledo.
Downing, J. M., Macomb.
Duncan, E., Jacksonville.
Dwight, C. R., Danville.
*Freeman, A. W., Chicago.
Freeman, D. B., Chicago.
Fisher J. W., Bloomington.
Gardiner, F. H., Chicago.
Green, E. J., Peoria.
Gibbs, A. E., Ottawa.
Gilmer, T. L., Quincy.
Gill, Henry C., Rockford.
Henry, Charles, Jacksonville.
Harrington, G. H., Delavan.
Hand, M. F., Joliet.
*Hobert, E. S., Ottawa.
Harrison, B. T., Gibson City.
Hurtt, J. M., Peoria.
Harlan, A. W., Chicago.
Honsinger, E., Chicago.
Hanaford, M. L., Rockford.
Hoadley, G. H., Byron.
Howard, G. O., Chicago.
Hyde, J. H., Lewiston.
Kitchen, C. A., Rockford.
Kingsley, G. P., Freeport.
Koch, C. R. E., Chicago.
Krape, W. W., Freeport.
Lionberger, J. M., Dallas City.
Lawrence, R. Neal, Lincoln.
McCoy, T. H., Pana.
Matteson, A. E., Chicago.
*Miles, G. S. Jerseyville.
Magill, W. T., Rock Island.
Mills, W. H., Freeport.
Marriner, J. Frank, Ottawa.
Murphy, J. D., Bushnell.
Matteson, C. F., Chicago.
Noyes, Edmund, Chicago.
Ormsbee, W. W., Geneva.
Patten, M. H., Springfield.
Pruyne, C. P., Chicago.
*Prichett, T. W., White Hall.
Pollock, D. J., Sterling.
Rohland, C. B., Alton.
Richards, W. P., Elgin.
Stevens, W. A., Chicago.
Smith, Joshua, Chicago.
Swain, E. D., Chicago.
Stephens, J. W., Dixon.
Sturgiss, S. M., Quincy.
Stone, E. C., Galesburg.
Schadle, A. C., Warren.
Salter, G. B., Joliet.
*Stewart, E. H., Joliet.
Talbot, E. S., Chicago.
Townsend, H. H., Pontiac.
Waltz, A. S., Decatur.
Widenham, J. C., Jacksonville.
*Woodward, W. B., Peoria.
Woodburn, W. W., Dixon.

During the four days' meeting the following named new members

were elected and qualified, each of them having been favorably reported by the Board of Censors:

Garrett Newkirk, of Wenona. C. T. Dorn, of Naperville.
W. H. Taggart, of Freeport. C. R. Taylor, of Streator.
G. D. Sitherwood, of Bloomington.

Dr. E. P. Hutchinson, of Bloomington, who had been dropped, in May, 1879, for non-payment of dues, paid $8.00, being in full to the time when his membership ceased.

The following is the list of corresponding and honorary members, with their residences, so far as known to the Secretary:

G. W. Keeley, Oxford, Ohio.
W. H. Eames, St. Louis, Mo.
Isaiah Forbes, St. Louis, Mo.
R. J. Poore, St. Louis, Mo.
F. A. Brewer, Palmyra, Mo.
W. O. Kulp, Davenport, Iowa.
K. B. Johnson, Chicago, Ill.
S. L Judd, Beloit, Wis.
L. C. Ingersoll, Keokuk, Iowa.
C. R. Butler, Cleveland, Ohio.
C. S. Smith, Lancaster, Wis.
C. W. Spalding, St. Louis, Mo.
Homer Judd, Webster City, Iowa.
Edgar Park, St. Louis, Mo.
H. J. McKellops, St. Louis, Mo.
H. S. Chase, St. Louis, Mo.
W. N. Morrison, St. Louis, Mo.
I. P. Wilson, Burlington, Iowa.
C. C. Chittenden, Madison, Wis.
R. S. Rathburn, Lyons, Iowa.
J. Taft, Cincinnati, Ohio.
H. N. Lewis, Quincy, Ill.
J. Hardtner, Springfield, Ill.
A. H. Fuller, St. Louis, Mo.

REPORTS OF OFFICERS.

The Secretary's Report was read by Dr. Noyes, of which the following is a synopsis:

Active members in good standing at date of last report	81
New members received in May, 1879	4
Reinstated in membership	1
Total	86
Loss by resignation: R. Matthews, of Pontiac. By non-payment of dues: N. E. Babcock, of Rockford; W. O. Butler, of La Harpe; W. C. Dyer, of Chicago; Warren Decrow, of Quincy; C. J. I. Murray, of Morris; and H. J. Smith, of Quincy	7
Leaving in good standing at this time	79

The Receipts for Dues and Initiation Fees were.....	$304 00
And for Advertisement in Transactions of 1878.... ..	5 00
Total	$309 00

For which the Treasurer's receipts are herewith submitted. Delinquent notices have been sent twice during the year to all members who were in arrears for dues; and within the past two weeks the Secretary has written letters to all those who were so far in arrears, that they must now be dropped from membership for non-payment. Six of these have since then sent their dues. They were all informed of the amount of their delinquency, and the day on which their membership would cease in case of continued non-payment.

There has been no other correspondence requiring special mention in this report.

The supply of blanks for delinquent notices and receipts will be exhausted during the coming year, and it is recommended that the Secretary be granted authority to provide what may be needed.

The Secretary has received courteous letters from a number of the persons to whom our Transactions have been sent, and a copy of the transactions of the Ohio State Dental Society. Also, the monthly numbers of a journal published in Spanish, at Havana, Cuba, in exchange for a copy of our Transactions.

The Report was accepted, the acco nts referred to the Executive Committee for auditing, and the Report adopted.

The Report of the Treasurer, Dr. E. C. Stone, which was read on the morning of the second day, showed Receipts and Expenditures as follows :

Balance in Treasury at last Report.....		$ 66 73
Received from Secretary		309 00
		$375 73
Expenditures as per Vouchers.....	$238 50	
Cash on hand.....	137 23	
		$375 73

The Report was received, and referred to the Executive Committee for auditing.

REPORTS OF COMMITTEES.

The Committee on Publication reported as follows:

REPORT OF PUBLICATION COMMITTEE.

Mr. President and Gentlemen of the Illinois State Dental Society.

Your Committee on Publication offer the following report:

In compliance with your instructions, two hundred and fifty copies of the Transactions have been published and distributed, none having been sent to the Dentists in this State who are not members of this Society. The expenses of publication have been as follows:

To Printing and Binding two hundred and fifty copies as per bill of Skeen & Stuart	$121 00
" Postage	10 00
Total	$131 00

Your committe thought it not advisable to solicit advertisements for so small an edition as two hundred and fifty copies.

Copies of the Transactions have been sent to the active and honorary members of the Society, additional copies being given to such of the officers and contributors of essays, as desired them—in no case a larger number than five or six. They have been sent to a considerable number of Foreign Dentists, and American Dentists in foreign lands, most of whom have received them each year for several years. Copies were sent to each of the Dental Journals in the United States and Canada, and to several foreign dental publications, to the libraries of all the Dental Colleges and the Deans of their faculties; to the library of the Chicago Historical Society, to the Chicago Public Library and the remainder were sent to the President or Secretary of the dental societies in the United States, so far as known, till the edition was exhausted.

Many of the State societies were omitted for that reason. Unless the Society desires to curtail the scope of the distribution by specific instructions, your committee would recommend that a somewhat larger edition be published this year—perhaps from three hundred to four hundred copies—but that the mailing list be confined to honorary and active members of this Society, officers of home and for-

eign societies, and publications, with a limited number of foreign Dentists and Societies, and prominent American Dentists residing in foreign countries.

Respectfully submitted,

EDGAR D. SWAIN.
EDMUND NOYES.
Publication Committee.

Dr. Crouse, the chairman of the Executive Committee, reported the published programme as the order of exercises for the meeting. He apologized for its late appearance by saying that the committee had endeavored to obtain the promise of some new men to take active parts in the meeting, and it had been impossible to get definite answers from them any earlier; 750 copies of the programme were printed, which proved not quite enough. Dr. Morrison, who was announced to operate in a clinic, has been injured by an accident, and has sent Dr. McKellops in his stead.

On motion of Dr. Swain, the Report was accepted, and the published programme adopted as the order of business for the meeting.

Adjourned till 2:30 P. M.

AFTERNOON SESSION.

The Society was called to order by the President at 2:30 P. M. The minutes of the morning session were read and approved.

The President called upon Dr. Marriner, the Vice-President, to take the chair.

The President then read the annual address, which was passed without discussion.

The papers earlier in order not being ready, Dr. Garrett Newkirk of Wenona, read his paper on "The Teeth and Nervous Reflex Action."

On motion of Dr. Crouse, physicians who might be present were invited to take part in the discussions. Dr. Newkirk's paper was discussed by Drs. Black, Talbot, Dean, Newkirk, Sturgiss, Swain, Cushing, Crouse, Brophy, Hurtt, J. A. W. Davis, Clark, Patten, and Townsend.

Adjourned till Wednesday morning, May 12th, at 10 A. M.

SECOND DAY.

MORNING SESSION.

The Society was called to order by the President at 10 o'clock. The minutes of the afternoon session were read and approved.

The Treasurer read his report, which was accepted and referred to the Executive Committee for auditing.

The subject under discussion at the time of adjournment, "The Teeth and Nervous Reflex Action," was passed.

Dr. Dean read a letter from Dr. C. R. E. Koch, of Chicago, explaining his unexpected absence

Dr. Koch's paper, entitled "The Treatment of Pulpless Teeth and Alveolar Abscess," was read by Dr. Swain.

On motion of Dr. Talbot dentists from other states who might be present were invited to take part in the discussions.

The subject of Dr. Koch's paper was discussed by Drs. Crouse, Swain, Newkirk, Cushing and Brophy. Dr. Black, of Jacksonville, exhibited a number of colored drawings, illustrating cases that have occurred in his practice, describing them in detail. The discussion was continued by Drs. Crouse, Talbot, McKellops, Sturgiss and Black.

Dr. C. W. Spalding, of St. Louis, was elected a corresponding member of the Society. After the calling of the roll the Society adjourned till 8 o'clock, P. M., the afternoon having been set apart for clinics.

EVENING SESSION.

The Society was called to order by the President. The minutes of the morning session were read and approved.

A letter was read from President E. C. Hewitt inviting the Society to visit the Normal University, either collectively or individually.

Dr. Cushing moved that the President be requested to reply to the polite invitation of Dr. Hewitt, and to say that while it would be impossible for the Society to accept it as a body, many individual members would be glad to do so. The motion was carried.

Discussion of "Treatment of Pulpless Teeth and Alveolar

Abscess" was continued by Drs. Talbot, Harlan, Brophy, K. B. Davis, Spalding of St. Louis, Taylor, Gardiner and Newkirk.

The subject was passed.

Dr. Brophy moved a vote of thanks to Dr. Black, for the beautiful plates he has prepared to illustrate the subject of "Alveolar Abscess." Some objections were made to the custom of voting thanks to members of the Society for *any* contributions they may make to the essays or discussions before the Society, to which Dr. Brophy replied that these plates were such beautiful illustrations of the cases described, were so interesting and useful, and had cost so much trouble to prepare, that this unusual notice of them was eminently proper.

The vote of thanks was passed.

Dr. J. J. Creswell, of Galena, read his paper entitled "Surgery in Dental Practice."

Dr. Crouse explained the arrangement for the clinics to-morrow afternoon. There will be seven operators, so as to enable a greater number to see without crowding, and there will be some other operations besides filling; an abscess will be treated, and there will be an operation of cleaning teeth.

Dr. Cushing, by permission, explained the scheme for an excursion to attend the meeting of the American Dental Association to be held at Boston next August.

Adjourned to 9 A. M. Thursday, May 13th.

THIRD DAY.

MORNING SESSION.

The Society was called to order by the President at 9 A. M. The minutes of the evening session were read and approved.

The Secretary was granted leave to amend his report in respect to one member reported dropped, but whose dues had been received in Chicago after the Secretary had started for Bloomington.

The Secretary offered an apology to Drs. Talbot and Brophy for the omission from last year's transactions of a vote of thanks to them, which was passed at the meeting in Springfield.

The subject of Dr. Creswell's paper was passed.

Dr. T. W. Brophy, of Chicago, read his paper entitled "Creo-

sote and Carbolic Acid—their Chemistry, and Uses in Dental Practice." It was discussed by Drs. Cushing, K. B. Davis, Spalding, Kulp, Harlan, Brophy, Hurtt, Talbot, Crouse, Black, Taylor, Harrison and Sturgiss.

The subject was passed.

Dr. E. Noyes, of Chicago, read a paper entitled "A Few Special Points in Dental Practice." Discussed by Drs. K. B. Davis, Cushing, Crouse, Townsend and McKellops, of St. Louis.

Dr. Crouse again explained the arrangements for the afternoon clinics.

Adjourned till 8 o'clock P. M.

EVENING SESSION.

The Society was called to order by the President at 8 o'clock. The minutes of the morning session were read and approved.

The subject of "Special Points in Dental Practice" was passed. Dr. G. V. Black, of Jacksonville, read a paper entitled "The Natural History of Caries and the Efficacy of Filling for its Arrest."

Dr. W. H. Eames, of St. Louis, followed with a paper upon the same subject. The discussion following was by Drs Talbot, Brophy, Eames, Townsend, Newkirk, Dean, Spalding, McKellops, Crouse and Hurtt.

The Society adjourned till 9 o'clock A. M. on Friday morning, May 14th.

FOURTH DAY.

MORNING SESSION.

The Society was called to order by the President.

The minutes of the evening session were read and approved.

Dr. A. H. Fuller, of St. Louis, was elected a corresponding member of the Society.

On motion of Dr. Swain, the Executive Committee were instructed to pay all properly authenticated bills against the Society, including the usual salary of $50.00 to the Secretary.

The President and Secretary were instructed to give delegates' certificates to all the members of the Society who will attend the meeting of the American Dental Association, not exceeding the number to which we are entitled.

Drs. Dean, Cushing, Swain, Pruyne and Noyes proposed an amendment to the constitution and by-laws by substituting the words "examiner and examiners" for the terms "censor and censors," wherever they occur in the constitution and by-laws.

Dr. Newkirk spoke on the subject of Dr. Black's paper, and the subject was then passed.

Dr. A. W. Harlan, of Chicago, read his paper entitled, "Saliva—Its Characteristics in Health and Disease." It was discussed by Drs. Dean, Swain, Spalding, of St. Louis, Black, Kulp, of Davenport, Cushing and Brophy. The subject was passed.

The subject of Mechanical Dentistry was passed without discussion, and there was no paper on that subject.

The Society proceeded to the selection of the next place of meeting and the election of officers.

ELECTIONS.

Rock Island was designated as the next place of meeting.

The election of officers resulted as follows:

President.....J. Frank Marriner, Ottawa.
Vice-President.....J. A. W. Davis, Galesburg.
Secretary.....E. Noyes, Chicago.
Treasurer.....E. C. Stone, Galesburg.
Librarian.....G. H. Harrington, Delavan.

EXECUTIVE COMMITTEE.

T. W. Brophy, Chairman.....Chicago.
W. T. Magill.....Rock Island.
J. M. Hurtt.....Peoria.

Dr. Marriner, the President-elect, was conducted to the chair, and thanked the Society for the honor conferred on him.

Dr. Kitchen the retiring President, was called for, and thanked the members of the Society for their kindness and considerateness, which had lessened the burdens of his position. He congratulated them upon the success of this meeting and the interest and value of the papers and discussions. The greatest interest and usefulness of the Society can only be attained when *every member* takes the trouble to make some direct effort to that end. The Executive Committee have had some difficulty to find men who were willing

to fill the places upon the programme. It is to be hoped that every member will be willing to respond, to the best of his ability, whenever called upon for such services.

Dr. J. M. Hurtt, together with Drs. A. W. Harlan, G. V. Black, T. W. Brophy, and E. Noyes, proposed the following amendment to the constitution. Add to article second the words: "And in no case shall a general ballot be dispensed with."

On motion of Dr. Swain, a vote of thanks was passed to Mr. S. R. Bingham, of S. S. White's dental depot, for courtesies extended to the Society in the mailing (including postage, etc.,) to the dentists throughout the State, of the programmes for the meeting, and in furnishing material and chairs for the clinical operations.

A vote of thanks was also passed to the Chicago Refining Company, and to Messrs. Ransom & Randolph, of the Toledo dental depot, for the use of chairs, etc., for the clinics.

A vote of thanks was passed to the Executive Committee, especially the local member of it, Dr. Campbell, whose unwearied efforts have contributed so much to the convenience and success of the meeting.

A committee appointed to draft resolutions concerning the death of Dr. Samuel S. White, reported the following which was adopted:

The Illinois State Dental Society desire to express their profound sorrow at the death of Dr. Samuel S. White, of Philadelphia, by which event the profession at large has sustained an irreparable loss. His generosity as an individual, and his deep interest in the profession, which led him to advance its interests by efforts tending always to its elevation, both as a science and an art, have endeared him to us in no ordinary degree, and we extend our sympathy to the profession at large as well as to his most afflicted family.

S. M. STURGISS,
T. W. BROPHY,
G. H. CUSHING,
M. S. DEAN,
Committee.

Dr. Crouse, chairman of the Executive Committee, reported that they had examined the accounts of the Secretary and Treasurer, and found them correct. The report was adopted.

Drs. Noyes and Swain were appointed the Committee on Publication.

The former Legislative Committee was reappointed: Drs. G. H. Cushing, of Chicago; G. S. Miles, of Jerseyville; and K. B. Davis, of Springfield.

Drs. J. N. Crouse, of Chicago; W. W. Ormsbee, of Geneva, and A W. Harlan, of Chicago, were appointed the Committee on Infractions of the Code of Ethics.

The President was appointed to deliver the next annual address.

Dr. Brophy moved that the Publication Committee be allowed, at their discretion, to employ a short hand reporter for the next meeting.

Dr. Black said that, unless a reporter has been used to professional reporting, it is very little use to employ him, but mentioned an excellent one known to him who might have been got for this meeting; could not tell how it might be next year.

Dr. Swain confirmed what Dr. Black said; had employed one once at his own expense, and wished before he was through that he had never seen him.

The motion was carried.

On Motion of Dr. Cushing, the Publication Committee were given permission, at discretion, to make arrangements with some Dental journal to publish the proceedinges of this year.

On motion of Dr. Hurtt, the Secretary was requested to rearrange, under their appropriate headings, the lists of Honorary and Corresponding members of the Society.

Dr. Kulp, of Davenport, wished to express his pleasure in visiting the Society at this meeting; and since it is decided to hold the next meeting at Rock Island, under the eaves of the Iowa Society, would do all that might be in his power to help make the next meeting a good one.

The minutes of the present session were read and approved.

There being no further business, the Society adjourned to meet at Rock Island on the second Tuesday in May, 1881.

EDMUND NOYES,
Secretary.

ADDRESSES, ESSAYS AND DISCUSSIONS.

ANNUAL ADDRESS.

BY THE PRESIDENT DR. C. A. KITCHEN, OF ROCKFORD.

The past century has witnessed the rise and growth of Dentistry in America. Although it was introduced at a most unfavorable time, when the country was in an unsettled condition in consequence of the Revolutionary War, it soon awakened an interest among the people.

That the business should *increase* and the number of Dentists multiply, was a natural result—was indeed a *necessity* in a country of such rapid growth—but the progress and development of the *science* of Dentistry have been more gradual. While the earliest dentists may have compared favorably with any in Europe at that time, yet they knew nothing about the skillful means *now* employed for saving the natural teeth, or the ingenious methods for substituting artificial ones.

The questionable practice of *transplanting* was probably more in vogue than *filling* among a large proportion of the dentists.

One Dr. Le Mayeur advertised that he had successfully transplanted 123 teeth in six months, although afterward admitting that not a *single case* proved a success.

Dr. Josiah Flagg, in his circulars, promised to "transplant both living and dead teeth with great conveniency, and give less pain than heretofore practiced in Europe or America." We are not surprised at the inattention given to *filling* when we remember that the best material known and used at this time was *sheet lead.*

The artistic dentist of that day was the man who could, with a degree of success, imitate the lost organs with artificial dentures carved from blocks of *ivory* or *bone*, and his *best* results were but clumsy specimens poorly adapted for the purpose intended. If we can *mark* the beginning of the development of the science of Dentistry, we must date it back to the time when sagacious men recognized the importance of *saving the natural teeth*—who felt their need of *more* knowledge and greater *skill*, and sought by study and close application to improve their methods and to inspire *others* with the same zeal.

A brief sketch of a few of the most prominent founders and active

laborers, who have contributed so much to make our profession what it is, may be of interest and profit, although I am aware that many of you are already acquainted with their history and realize the worth of the services they rendered.

Just about one hundred years ago, James Gardette, a Frenchman, began the practice of Dentistry in that city that has been called "The Cradle of American Dentistry." There were others engaged in the business before he came, but for reason of his prominence he deserves more than passing notice. He had attended the medical school of Paris, and was a regularly commissioned surgeon in the French army previous to the time when he located in Philadelphia. His deportment so *differed* from that of the *itinerants* who had preceded him, and he displayed such *judgment*, care and *dexterity*, that his merit was soon known and his *success assured.* He made some important improvements in the mechanical department, and first of all applied the principle of atmospheric pressure or suction. He was the early advocate, if not the *first* man to recognize the wisdom of affording space for the proper arrangement of the natural teeth, by judicious extraction in youth. He was among the first to substitute *gold* for *lead* as a material for filling, and showed its superiority over the baser metals. Dr. Gardette published an article on the "Transplantation of the Human Teeth," at an early date, in which he cited many cases of failure that came under his observation. He practiced *replanting*, and is believed to have been the first man who called *attention* to it. After a continuous and successful practice, reaching over a period of *forty-five years*, Dr. Gardette returned to France and died at Bordeaux in the year 1831.

Three brothers, Greenwood by name, were among the earliest Dentists, of whom John was the best known. He was the first who used *gold plate* as a base for artificial teeth—as early as the year 1799. About that date he effected the cure of a diseased maxillary sinus, by perforating the cavity from the socket of a molar tooth and injecting remedies. He constructed sets of teeth for General Washington, and was much esteemed by that eminent gentleman.

Horace H. Hayden began the practice at Baltimore in the year 1804. Having received no previous instructions from a preceptor, he procured the few available text books then extant and *mastered* them; although sadly deficient in his humble *beginning*, he, by close

application and indomitable energy, reached a conspicuous place among his contemporaries, and was one of the *first men* to urge a *higher standard* of scientific attainment. He studied medicine, and afterwards received the honorary degrees from both the University of Maryland and Jefferson College of Philadelphia.

We owe more to his individual efforts than to any other man for the first Dental Society and the first Dental College in the world.

He died at the advanced age of 74 years, while holding the positions of President of the American Society of Dental Surgeons, and President of the Baltimore Dental College. His life and labors show us what may be accomplished by *untiring industry* and *earnest investigation*. Edward Hudson located at Philadelphia in the year 1805. He had enjoyed superior advantages, and was a polished and refined gentleman. His preceptor, a relative, was a prominent dentist of Dublin, Ireland.

Dr. Eleazar Parmley said, "We are indebted more to Hudson than to any *other man* for the importance attached to saving the natural teeth, at that early period. For by the complete success attending the practice of this great man, the public was soon convinced that the teeth could be *saved*. The surgical department, embracing all required operations on the living teeth, was as well understood by Hudson as by any operator who ever lived, either before or since that time." Dr. Chapin A. Harris said, "Hudson was *idolized* by his patients as few of his professional brethren can ever *expect* to be."

John Randall, while a student at Harvard College, in the year 1803, called upon a dentist to have his teeth examined, with a view of having them *saved*, but was informed that the business of the dentist was only to furnish *artificial substitutes*. *This* seemed to Randall to be but a limited sphere of usefulness for a dentist, and with a determination to know more of the art, he purchased text books, and after some preparation, began to operate upon his own teeth and those of his own fellow-students. After completing his college course he studied medicine and practiced the two branches successfully for many years. Dr. Randall never *advertised* his business, although that method of attracting public attention was the prevailing custom at that time. Leonard Koecker located at Philadelphia, in the practice of Dentistry, about the year 1807. He had

previously failed as a commercial agent, and knew absolutely nothing about Dentistry. Yet he had such *energy* and natural *ability* that he *overcame* all obstacles, and soon established the reputation of a *careful* and *capable* dentist. He was *pre-eminently* a self-made man. Although deprived of early advantages, he had a natural thirst for knowledge, and his innate consciousness of the power conferred by *education*, made him all his life a student; at *first* greatly in need of knowledge himself he afterwards became a teacher of *others*. He published a work on Dental Surgery in the year 1826, which at that time was one of the best text books extant. Dr. Koecker was the first man to recommend capping pulps. It was his belief that an average of five out of six teeth could be saved alive after exposure by this plan of treatment.

The brief account I have given of those who seem to me to have been the *leading* men among the founders of Dentistry in America will serve to show, or remind us, that they were well-fitted for the times and the places they filled. The results of their labors may appear *insignificant* when contemplated from our *present* standpoint, but when we consider the circumstances which surrounded them, the *difficulties* they were forced to contend with, we can but admire the jealous devotion with which they endeavored to give the new profession character and respectability among the people and to lay its foundations *broad* and deep. In the year 1840, a time of great activity, the men I have named, with others who became equally distinguished, came together and organized the American Society of Dental Surgeons. This event marks an epoch in our history, for through its influence and the efforts of its members the first dental college and the first dental periodical were soon established. Dr. Chapin Harris was prominently connected with these enterprises. He is known to every student of Dentistry, and his works are to be found in the dental libraries everywhere. Dr. Elezar Parmley, another zealous and faithful man, noted for his skill as an operator, was the friend of every scheme proposed for the advancement of his chosen calling. During what was termed the "Amalgam War," Dr. Parmley was pronounced in his opposition to the use of what was then called "*mineral paste*." He was a firm advocate of the "*purest and best metal*." Many of his gold fillings and gold plates, made 30, or even 40 years ago, are doing good service to-day,

attesting the skill and care of the *man* and the durability of the *material*, if *properly* used.

I need not name others who were in hearty sympathy with and rendered valuable assistance to these leaders. All were honest in their convictions that their well-directed labors would advance the interests of the profession, and years of experience have proven their wisdom and fore-thought. The actual result of *one* man's efforts in a laudable enterprise will often astonish us, while the possibilities of a harmonious, active body of men in a certain direction are almost incalculable. We can have no words except of *praise* for the admirable and satisfactory manner in which these men planned and instituted the three agencies which placed within the reach of all who *desired*, the means to acquire more easily the knowledge which previous to this time was obtained only by a *plodding, patient, persevering process* of *action—particle* by *particle*, *thought* by *thought*, *fact* by *fact*.

The Dental periodical has been in the past, and still is exerting a *wonderful* influence in our development. Yet I doubt if it benefits *all* alike. To the man who is abreast with advanced *thought*, who can rightly discern truth and reality, detect error, who *knows* the writers and can *peretrate* their motives, the Dental Journal is an *indispensable source* of profit; while to others less discriminating, it may prove a delusion and a snare, so long as conspicuous places are given to articles from men who seek to promulgate doctrine and recommend practice wholly at *variance*, with the experience of a large majority of our wisest educators and most successful operators. The Dental Colleges have recently taken advanced steps; only a few years ago they bestowed their diplomas and honorary degrees with lavish impartiality upon *unworthy* as well as worthy applicants. *Now*, most of them require candidates to pass *rigid examinations*. I know our colleges are *still* subjected to severe criticism, but it is always easier to find fault than to suggest a *remedy* for existing defects. Of this fact I am quite *positive* that if the right *kind* of young men are sent to our best institutions, who will use the means there afforded to advantage, there will be little reason for complaint.

No young man, though he have the genius and energy of a Hayden or a *Koecker*, should risk the hazardous experiment of trying to reach the elevated positions those gentlemen occupied by the same rugged and tortuous paths they traveled, since more direct avenues are open before him. The Dental College course should

now be deemed a *necessity*, and ought to be enjoined upon every student by all preceptors.

The *grandest* work of the worthy men of whom I have spoken was in establishing the Dental Society, for by their combined strength and concentrated efforts they were enabled to accomplish that which they could not have *hoped* to do in any other manner. Through the interchange of thoughts and sentiments which followed, *harmony* and *friendship* began to prevail among respectable and well-informed dentists, and *all* were stimulated to greater exertion and closer investigation.

In each one of the numerous associations throughout our country *to-day* there are noble, self-sacrificing men who, actuated by the same motives that prompted our fathers, are doing all in their *power* to sustain and advance the interests of the profession. *This* Society has its *stalwarts*, who, since our organization fifteen years ago, through the first few years of its precarious existence, and through the more prosperous years which followed, have been regular in attendance and always ready to respond when called upon to perform duty. They are men to whom time is more *valuable* than to many of us, who have no *ambition* to gratify, for they have received the highest honors conferred by more august bodies. Others, after obtaining certificates of graduation from our best dental colleges, have gone on to still greater conquests and captured diplomas from the leading medical colleges. Our distinguished professional friends of St. Louis and other neighboring cities usually meet with us, and we have learned to regard them as *our own*. Their presence is always a delight and an inspiration.

The *veterans* rich in years of experience, our young men fresh from new fields of investigation, come to these annual reunions bringing offerings to the common treasury, from which we may all partake with both pleasure and profit. Strangely enough, however, *some* of our members are sometimes *absent* from our meetings. I am of the opinion that if *our patrons* could know how much *we lose*, and their *own* indirect *loss*, they would feel great *disappointment* at our indifference. Those who are most *discerning* are certainly *pleased* to see a desire in us to avail ourselves of every means offered for our improvement. In closing let me urge upon the members of this society a consideration of the following practical suggestions:

1st. That to receive all the benefits possible to ourselves as indi-

viduals, to the body corporate, and to the public (our patrons whom we serve), we must take a lively interest in the work of the society; attend the annual meetings regularly; determine to hear every paper read and the discussions following. Pardon this digression, but last year there was a most interesting and valuable discussion on cylinder filling in which some of the most expert operators in the *country* took part. A majority of our members were absent receiving instructions in something of *far less* importance at an expense of from five to seven dollars each. It is a *mistake* to allow *outside* matters to attract attention from the business in hand and for which we have assembled. 2d. To accept cheerfully any duty assigned and perform it to the best of our ability. No matter if we *know* others might do better. In reviewing the history of Dentistry and the lives of its founders in this country, we recognize the fact that progress in the *past* has resulted from *individual* and *associated efforts. Continued* advancement must, therefore, depend upon *personal* and *co-operative* labor.

In the *past*, those who rendered efficient services, were always in the *minority* and had to contend with the opposition of the *careless* and *selfish* majority. So in the time to come, further development must depend on the energy and faithfulness of the *few*. Yet so long as there remains that earnest *desire* for progress, that thirst for *knowledge* which characterized the men whose *memories* we should *cherish* and whose examples we should emulate, we need have no fears about the future of our profession.

We need not *expect* to reach such a degree of excellence that there will be no more failures, but if while striving after the unattainable we may be able to lessen the *ratio* of errors and mistakes each year, that will be a sufficient recompense for the *most* and *best* we can do.

A SHORT PAPER ON NERVOUS REFLEX ACTION.

Mr. President and Gentlemen of the Illinois State Dental Society:

I wish to call your attention—for a few minutes only of your valuable time—to a few thoughts concerning the importance of the phenomena belonging to what is known as reflex action.

It is certainly no less the duty of the dentist than the physician to make himself familiar with these phenomena, and, so far as possible, the principles involved in their production.

Since the discovery by Harvey of the circulation of the blood, there has been no one theory advanced in the domain of physiology so full of meaning and explanation; none so suggestive of unity on the one hand and numberless possibilities on the other.

As the circulation of the blood unites, in a sense, all the fluids and all the solids of the body, as the blood that is one moment passing through brain, may in the next be permeating the tissues of the kidney; so nervous action, properly understood, demonstrates the unity of the living force, and the sympathy and close relationship of parts exercising diverse functions.

Dim and indistinct ideas of an existing sympathy between parts remote from each other had long been entertained, but it was reserved for Dr. Marshall Hall to place the matter in clear light, in 1833, in his work on the "Structure and Functions of the Spinal Cord."

Professor Muller, of Berlin, almost simultaneously discovered the same facts, revealing to us the division of the spinal cord into motor and sensitive tracts, and the duplex character of the spinal nerves.

Lately, in our own country, Dr. Brown Sequard has done more than any other to increase our knowledge of nervous action.

I cannot, in the space to which I have determined to limit this paper, do more than glance at a few of the important features of the topic.

What do we understand by this term reflex action? The terms reflex and reflect, or reflected, are from the same root, with the same original meaning. We say a light is reflected, when it originates at a certain point, passes to a second, and from thence is sent in a different direction to a third. In this kind of reflection the second and third objects are but passive agents. They do not *act*, but are acted *upon*; they undergo practically no change. But in nervous reflexion, *all* the agents are active, *all undergo change*. Point first receives and conveys to point second a positive impression. There is a positive conversion of force at point second, and a positive effect at point third.

The point of departure in nervous reflection is the extremity of

one or more sensitive nerve fibers. It may be one or ten thousand. The point of reflexion is a ganglion or mass of nerve matter in the spinal cord, the brain, or great sympathetic system.

The sensitive fiber or fibers receive an impression; force is transmitted to the central nervous mass, passes from thence by a motor root and nerve, or nerves, to the gland, muscle or other organ to be acted upon.

If I introduce something new in the order of arrangement I trust you will pardon me for employing a somewhat hackneyed illustration, that of comparing the nervous organization to a vast telegraph system. Let us call the brain the general depot, the head-quarters of the *general superintendent*. The ganglia of the spinal cord and great sympathetic we will say are head-quarters of the various division superintendents. The end of each nerve filament is a local station.

Then, let us imagine the stations everywhere so thick that a pin-point cannot find room between them, and we have a picture of a great empire within the human body, an empire teeming with life and energy, a vast system of organized forces, aggressive and resistive, with wonderful resources and unceasing industries, in which at every point the nerve sentinels keep watch and guard.

Carrying forward the illustration, let us notice, with regard to the nerve sentinels one important fact. Every local station has its own wire that goes direct and clear through to division head-quarters. The little wire—the little nerve—does not join a larger nerve and lose itself in it. No! Each little nerve filament keeps its individuality. It joins other filaments and travels side by side with them, in the same sheath, to the same central office, but it remains itself, ready to convey the message from the *local* office whence it starts.

We may speak of the great sciatic as one nerve, but in reality it is a bundle of ten thousand nerves, that are traveling together for mutual convenience and safety.

We speak of the great sensitive nerve of the face—the fifth pair with its three grand divisions—but it is many in one. Does the minute nerve, going from a single tooth-pulp to the main trunk, become really lost it it? Not by any means. We may not be able to trace it, but it undoubtedly goes clear through. It is the line of communication direct between the pulp and division head-quarters, where each special dispatch receives special recognition.

See how admirably adapted this is to local necessities. Suppose for instance the index finger receives an injury—a cut or burn. The nerve agents at that point telegraph immediately to the division superintendent at the cervical spine for repairs—an increased amount of blood and energy. The message goes straight through, on the index finger's special wire. It is transmitted further, to the conscious brain. There is no mistake about it. Both the brain and the spine know just where it comes from, know what the trouble is, and where to send supplies. But suppose the index finger's wire joined other wires, so as to lose its identity—all the wires from all the fingers and the thumb going up as one. How would the superintendent be able to locate the point of disturbance? How could he distinguish between these several members, know exactly all their needs, and so unfailingly supply them? According to that universal law of creation, by which *wherever a necessity exists*, the thing necessary is there present; each local station has its own wire, and the security of local interests is thus assured.

In order to attain a proper understanding of this subject, we must rid ourselves entirely of the notion that *small* nerves are branches simply of *big* nerves, shot off in various places like the boughs of a tree; or tributaries merely, like brooks and rivulets, whose waters meet, mingle and are lost in some larger channel. We must understand that each nerve, however small, is a *nerve by itself;* an independent citizen of the great vital commonwealth, responsible to head-quarters for its conduct and good behavior; each filament attends to its own business, and reports to the division superintendent.

As previously stated, a *big* nerve, so-called, is a *big bundle of small nerves.*

Imagine ten thousand microscopic wires wrapped together in tissue paper, going up to the cord and brain. As they pass along, pinholes in the paper admit other wires, the sheath enlarges a little to make them room, until, as we approach the center, we find the little wires and the little bundles have made a great *cord*—just as fibres makes threads, threads make strands, and strands make a rope.

For simple illustration I have taken the most simple form of reflex action—that of a nerve conveying an impression, as in the case of he index finger, and the nerve center responding at once with a

message to the same part. This may be called direct reflexion, as when one's image is reflected to himself from a glass. We get the essential idea.

But as we analyze a drop of water and in a sense know the ocean, while we still fall infinitely short of a knowledge of its breadths and depths, so we may comprehend the simpler forms of nervous action while the vast and complicated movements of its waves and tides are wrapped in the mazes of the infinite. Comparatively we know but little about it, yet the little we do know is of great practical importance. Having learned our alphabet, we are beginning to spell and to read. From the simple we are reach ing out after the more and more complex.

Allow me to present before your minds a picture in which is shown most beautifully both the theory, and practical operation of nervous reflex power.

As during fetal life no air can enter the lungs, the muscles of respiration are not called into play, and that part of the nervous tract which is to exercise control of this function cannot act. They are all ready. The wires are laid, the operators are in position at their respective instruments. The superintendent of respiration is in his place, *waiting for the first call.*

And now the time has come. The grand climax of maternal agony has been reached, and the man in miniature ushered into the world.

But he does not breathe! The nerve operatives have not awakened from their long first sleep. Their sleep is deepened by the poisonous excess in the blood of carbonic gas.

There is no touch upon the keys of life. The division superintendent of the lungs hears no call.

The amount of oxygen in the blood grows less, and the skin is livid.

It is a moment of great anxiety. Will the child die? What can save it?

Nervous reflex action!

The physician understands something of its operation; he takes a handful of cold water and throws it violently upon the sensitive skin of the face and chest.

Ten thousand sleepers waken. Ten thousand wires thrill with messages to the nerve centers.

"What's that?" says the now aroused division superintendent. *A call for air!*

For the first time, but instantly, his fingers strike the keys. The diaphragm goes down, the costal muscles contract, the chest heaves; a vacuum is made, the oxygen comes in, the carbon passes out, the blood starts with a bound, and every fiber quivers with re-awakened life.

The vocal chords play their first little tune, beginning in a faint minor key, but swelling with each fresh inspiration into the first song of personal freedom.

The physician draws a sigh of relief, the paternal heart beats again; the exhausted mother finds strength to exclaim, "Thank God!" then pillows her head to grateful sleep.

What an example of the conservation stored up in the possibilities of reflex action!

What should we think of the physician who would dare to remain in ignorance of all there is to be known of its practical benefits, and in his ignorance fail to strike the keys at the instant when a world of human happiness and destiny may depend upon a moment of time.

Examples might be indefinitely multiplied.

There is not a well-understood process going on anywhere in the body wherein reflex action may not be seen playing an important part.

Leaving it out as the key of mysteries, there is little we can properly understand.

By it parts remote from each other are brought near. They seem to understand one another's needs, and do, practically, "bear one another's burdens."

By reflex action injured parts are restored, overworked and weary organs receive rest. They labor together in health and suffer together in disease.

When the head grows dizzy and faint, the stomach sickens, and the skin responds at every pore.

Food gives a normal irritation to the fauces, and we swallow. A feather gives an abnormal irritation, and we vomit.

The auditory nerve is irritated by the filing of a saw, or the performance of the amateur pianist, and our *teeth* are set on edge.

The grand offices of reflex action are the preservation of life and the conservation of force.

The nervous system presides over all, and every officer and man, from the general superintendent down to the most minute local agent, owes and cheerfully gives, *allegiance* to the *union, and stands by the constitution and the laws.*

Each citizen tries to perform his own duty faithfully, and subordinate to the public good. In the condition of general health each has sufficient to do, but not too much and everything moves smoothly.

But accident, sickness and disease work numerous exceptions to the rules of health.

Then it happens that nervous action becomes irregular. Abnormal irritation at one point is transmitted to another, in the form of pain or spasm. In such a case, *pain* being referred to a part *not* the seat of trouble, cannot be relied on as a symptom standing alone.

Each local station having direct communication with cerebral or spinal head-quarters, the rule of health is that the superintendents at these points can tell with perfect accuracy where trouble exists and just what to do about it.

But suppose the superintendents are themselves afflicted, having become irritable from overwork and lack of rest; what marvel is it if they sometimes get confused, strike the wrong keys, and send wild messages?

By an investigation of these matters we arrive at more and more perfect conceptions of physiological unity.

We learn that when we put a needle-point upon the skin of the finger, we are not touching merely the skin, not merely the finger, but we are touching nerves, and *by the nerves, through the cord pricking* the *conscious brain.*

We are taught the important truth that we cannot disintegrate this vast empire of the human body, take a fraction of it for treatment or experiment, and quietly ignore the great remainder. Each and every part is bound to the whole by ties that will not snap at our bidding.

We are taught that we must dip down deep into the mysteries of *general* physiology and pathology, ere we may reasonably hope to deal rightly with the local and the special. Else how are we to read

aright signs and symptoms, make correct diagnoses, or use proper means for the prevention and cure of diseased conditions?

Can any man expect to practice any specialty with satisfaction and security, with crude and indefinite ideas of general physiology, pathology and therapeutics, reflex nervous action and the philosophy of pain?

Has a man any guarantee against mistakes who does not understand that an indigestion, a uterine irritation, a dysmenorrhœa, a pregnancy, a rheumatic joint, an hysterical emotion, or a more or less distant local inflammation may be the loose key of the instrument causing unpleasant vibrations at the extremity of a dental nerve?

Not every physician understands as he ought how far disturbances elsewhere may be, by abnormal reflex action, referred to diseased and irritable tooth-pulps, that an abnormal condition of the mouth and teeth is a most common cause of facial and cranial neuralgias, indigestion and non-assimilation of food; sometimes of deafness and disorders of vision, and frequently of nasal and bronchial catarrh.

Whatever we may say to the proposition that "Dentistry is properly a branch of Medicine and Surgery," the fact remains beyond dispute that we cannot lay the foundations of our profession *too broad and deep* on the rock of general knowledge. The fact remains that we cannot deal with any important organ of the body and that alone—touching one we touch all.

Many forces are playing on the many keys of life. It is an easy thing to produce discord, but if we are to make *harmony* while playing on *one key*, we must understand something of what the other keys are saying.

DISCUSSION.

DR. BLACK: I hardly feel like talking on this subject this afternoon. It is of very great importance to medical men; perhaps it is so to dentists. It is exceedingly difficult to handle—one of the most intricate and difficult with which we have to deal. One fault of practical men in dealing with it is the lack of a sufficient record of facts. We can get along pretty well in its comprehension when the conditions are healthy, but the difficulty is very greatly increased in diseased conditions. When irritated tooth-pulps give rise to diseased reflex action, there is usually very loose descrip-

tion and inadequate observation; the phenomena are described without any effort to ascertain or describe the exact *condition* of the offending pulp; nothing is known except the general statement. We want observations that note minutely the conditions that give rise to these faulty reflex actions. The subject is so difficult as to require a great deal of time and very close observation. If we find a diseased pulp causing reflex effects, we should observe very carefully the exact conditions, and compile all similar cases for careful comparison.

DR. TALBOT: The paper has probably given about all that is known about this subject, and the illustration is a good one. We soon come to the limit of what is explainable in regard to it. What we understand by reflex action is the transmission of an impression from one part to another without the action of the will. In our profession, we notice more particularly the effects produced by dentition. The intestinal disturbances and other diseases which make the second summer so dangerous to children, are often caused by reflex action from the irritation of coming teeth, and I do not understand the reluctance of some physicians to remove the cause by lancing the gums.

The reflex action which sometimes determines the location of pain in a tooth which is not the cause of it, may occasionally lead to serious trouble or injury unless the real cause of the pain is discovered. A case was under my observation of a very nervous gentleman who complained of neuralgic pain starting from a first bicuspid which had a sensitive cavity in it. The teeth next back of it were gone. The pain continued after filling. After two months of unsuccessful treatment, the pulp was destroyed and the root perfectly filled to the apex (as afterwards appeared when extracted). The trouble still continued, and the tooth was finally removed. In two or three weeks he returned with pain in the same location. Careful examination revealed a cavity with an exposed pulp in the wisdom tooth. This was extracted, and the pain was cured. In this case the bicuspid was lost for want of timely discovery of the real cause of the trouble. We *sometimes* find the trouble arising from a tooth in the opposite jaw and the other side of the mouth from the one designated as being the seat of the pain. The wisdom teeth are probably oftener the cause of these reflex effects than any others.

DR. DEAN: This is a subject in which I am interested, and I will offer a little conundrum to these gentlemen who are posted in regard to reflex action:

Some of the terminal nerves in the lower jaw are irritated, and we have pain reaching down to the clavicle and arm, causing paralysis in the arm. As the nerves go to the central ganglia direct, from what point is the influence sent to the arm? Or, in the same way, if the pain is in an upper tooth when the lesion is in a lower one, how does the impression go astray? Or, in the illustration, how do the wires get crossed?

DR. NEWKIRK: Suppose a sound upper molar aches, and in the opposite jaw on the other side is a diseased tooth. The aching tooth does not respond to heat and cold, etc., but the diseased tooth does. For some reason the central ganglion takes false consciousness of the source of the impression. Can this take place if the ganglion itself is not diseased? Dr. Allen insisted that there is no abnormal function without diseased structure, but the disease in most of these cases must be very slight in the ganglion, for as soon as the irritation of the terminal nerves is removed, the trouble ceases. There was a case described some time ago in the "Cosmos," of a man whom Dr. Garretson operated upon (having made a protracted special study of it), who had for many years suffered the tortures of an excruciating neuralgia. He had been operated upon in Europe and examined by a number of eminent surgeons there without any relief. The trouble was a minute irritation of one of the nerves at the point of its passage through a foramen, and the operation was entirely successful. In one case pain in the larynx was caused by a diseased tooth. In another, a difficult dentition (of a wisdom tooth), caused blindness of one eye for twelve years, which was cured at once by the removal of the offending tooth. Spasm, threatening tetanus, is sometimes caused in the same way. In one case a diseased tooth caused insanity, which was cured by its removal.

DR. BLACK: In these cases was there any record of the exact condition of the diseased teeth? This is a two-edged sword. A diseased tooth may be the cause of pain or disease in another tooth, or in other parts of the body; and on the other hand, disease in other parts of the body may cause pain in the teeth. This is especially the case with uterine irritation, catarrh and some others.

DR. STURGISS: Is not reflex pain oftener in an antagonizing tooth than any other? Why should a diseased tooth single out *this* one for a scape-goat instead of another?

DR. NEWKIRK: Teeth that grow at the same time are in closer sympathetic relation than others; but is it not *oftener* on the other side and in the other jaw?

Dr. Crouse and Dr. Black thought it oftener on the same side; not so often crossing the median line.

Dr. Newkirk described one case in which it did cross over to the opposite side and the other jaw.

DR. SWAIN: The paper says that each nerve filament runs independently to the nerve-centers (crossing from the right side of the body to the left side of the brain). If that is so, what is the use of the ganglia outside of the brain? I have supposed that the ganglia were terminal to the nerves running to them. That each ganglion is sufficient brain for the nerves coming to it. I do not believe that nerves can be traced by the microscope through a ganglion individually.

DR. DEAN: I think the opinion is that the individual nerve filaments do go through the ganglia.

DR. NEWKIRK: I think some of the filaments do terminate in the ganglia, but not all. They cannot be traced. The opinions are theoretical.

DR. CUSHING: I am glad that this subject has been brought up, and I hope that the practical aspects of it may be more dwelt upon. Many dentists have not given attention enough to reflex action for the purpose of explaining the obscure cases of pain or disease presented to us. One case in my own practice presented the condition, of the mouth almost entirely closed—it could only be opened sufficiently to admit the introduction of the handle of a silver spoon. Extraction of an ulcerated tooth, gave entire and speedy relief.

Dr. Freeman had a case in which there was paralysis of the arm. This case also was relieved at once and completely by the removal of the offending tooth. I do not think that anybody can explain the *reason* why such effects are produced. We know the *facts*. I would explain Dr. Dean's question by saying that when an afferent impulse is carried to a nerve center it is transmuted there into an efferent impulse or impulses, the character of which depends upon

the condition of the nerve center at the time, and which may call forth the most complex movements. Dr. Beard describes the most extraordinary reflex effects from the slightest causes. I do not think any of the men who have written upon this subject know very much about it. Dr. Beard's work is the first falling under my notice wherein a medical man has given sufficient prominence to the effects produced upon the general economy by diseases of the teeth.

DR. CROUSE: I agree with Dr. Cushing in regard to the importance of the practical part of this subject, and also the proposition of the essayist that dentists might profitably know more of general subjects pertaining to medical practice. I have had patients come with toothache from malarial causes, which was cured by a little quinine. In one very marked case of reflex action the patient had long continued and severe neuralgia. After treating several diseased teeth without relief, the removal of a bicuspid having a large exostosis entirely cured the neuralgia. We have all observed that the drying or exposure to cold air, or to an escharotic, of a tooth covered by rubber dam and being operated upon, will often cause complaint of pain in the teeth of the other jaw.

DR. BROPHY: The opinion has been expressed here that an impression may be conveyed to the Gasserian ganglion and back to some other point without going to the brain. That is impossible!

DR. Swain explained by saying that whether all or only a part of the nerve fibers travel through the ganglion on their way to the brain without loss of identity, they are at any rate very intimately associated together in the ganglion, and we may suppose that the impression coming to it through the nerves of a particular organ may produce such an effect in the ganglion as to cause irritation of the nerves arriving there from some other organ, so that the impulse finally sent to the brain may indicate a wrong location as the source of the original trouble.

DR. BROPHY: I think it is impossible to trace the nerve fibers through the ganglia. The explanation is *no* explanation, I cannot give one, I have never heard one given, but I believe that we shall be able sometime to explain and understand these cases. I think that reflex pain seldom crosses the mouth from one side to the other, but it may be transmitted to any part of the same side.

DR. BLACK: I do not suppose that the separate nerve fibers can

be traced through the larger ganglia, but they are traceable through small ganglia, and we may, therefore, infer that they do go through the larger ones. In regard to the perversion of sensation, every irritation of the ends of the nerves produces irritation of the nerve centers, whether in the ganglia or in the brain—change takes place in cell functions. The impression of pain may finally pass to the brain, but cell irritation in the ganglion may pass from cell to cell and cause the impression of pain to be felt in other nerves coming to the same ganglion, while the original impression is lost in the ganglion; or if a similar change takes place in the brain the real trouble may be in a part of the body very distant from that from which the impression of pain appears to come. I have had three cases of paralysis of the arm caused by trouble in the teeth. One of these had a history of a tooth sensitive to cold, the others not. In all there was more or less pain about the jaws. In one case the progress was slow for six or seven months, but by the end of that time the arm was quite useless. The paralysis was cured in this case by the removal of a diseased pulp.

DR. HURTT: If the pulp of a lower molar were dead, and the roots remaining, accompanied by paralysis of the lower lip, what relation might there be between the dead roots and the paralysis?

DR. BLACK: It might be produced by abscess with condition involving pressure upon the nerves passing through the mental foramen. In that case it would not be reflex but caused by direct pressure.

DR. HURTT: An abscess on the side of a molar root, the pulp in the tooth being still alive, produced partial paralysis of the lower lip and pain all along the side of the face. The destruction of the pulp relieved both the pain and the paralysis. Was it the irritation of the dental nerves, or the nerves of the gum tissue that caused the paralysis?

DR. BLACK: This case is difficult to answer as a whole. Probably it is not a serious case of *perversion* of nerve function, but is caused by the irritation of a *region*. It is inflammatory in character, and may arise in robust persons, while the other class of cases are confined to anæmic persons.

DR. HURTT: I am not satisfied with Dr. Black's explanations. The connection between the pericementum and the pulp is direct,

and so an abscess on the cementum might be expected to cause irritation of the pulp, and give rise to reflex effects through the inferior dental nerve. It was for that reason that the pulp was destroyed, which gave immediate relief as before stated.

DR. NEWKIRK: A pulp may be alive and diseased. An abscess on the side of the root means preceding and present irritation of all near parts, which may cause constriction of the vessels at the entrance to the pulp, and so the destruction of the pulp may remove the cause of the secondary inflammation.

DR. TALBOT: The location of reflex effects is often determined by a weakened vitality or exposed condition, caused, perhaps, by previous disease or present imperfection. If an exposed or diseased pulp gives rise to reflex pains in some other tooth, it is likely to be in one that has been sometime diseased, or that has nodules in its pulp, or has been somewhat irritated by heat and cold through a large filling (if there are any teeth in the mouth having such predispositions).

I know a young lady who had pneumonia last winter and recovered, but now has consumption, and will soon die. All the family have hereditary predisposition to consumption, and the reflex effects of this predisposition rapidly developed consumption, while the lungs were weakened by the pneumonia.

There are two sets of ganglia, one of which does carry impressions to the brain, but the other set often reflect them to other parts without going to the brain.

DR. SWAIN: The interest felt in this subject was manifested when all the members present gathered together to hear Dr. Dean. I think an hour might be profitably spent in relating cases involving reflex effects which have come under our notice, and describing the methods of treatment.

DR. J. A. W. DAVIS: In one case a diseased wisdom tooth was the cause of deafness, which was cured by the removal of the tooth. In another case a lower bicuspid was diseased and aching, and this and a sound upper one were removed, one after the other, without any relief, but the trouble was cured by the removal of a diseased wisdom tooth.

DR. CLARK: A lady called to have a plate repaired and spoke of having had a great deal of pain in her head for many years.

I examined the teeth carefully; the front ones were remaining as far as the bicuspids. They were beautiful teeth and perfectly sound, but pressure upon the gums caused oozing of pus from the margins. The molars and one bicuspid had been sacrificed on this account. The trouble was on one side of the mouth only, not passing the median line. She had been treated by several good dentists and physicians, and not having come to me for that purpose, I did not undertake the case. What treatment would be proper in a case like that?

Dr. Swain asked if he were satisfied if the pulps were dead?

Dr. C. said no, but pus came out over the apex of the roots.

DR. SWAIN: I have had a similar case in hand for some time. The gentleman has been treated for years for a severe pain in his head. It seems to be on the outside of the head, and not as if it were in the brain. When he first came a first upper molar was tender and careful examination showed it to be dead. I thought I had discovered the cause of all the trouble. Opening of the tooth and cleansing of the pulp canals gave relief for a time, but he soon returned. He was not relieved by changes of dressings, and after two or three days of suffering, I removed the tooth; but there was no relief from pain and the wound did not heal readily. There was some necrosed bone, and finally all the outer portion of alveolar process from the wisdom tooth to the bicuspid was removed. Have since removed the bicuspid. There was some exostosis on the roots of both the teeth removed, but the trouble is not yet relieved. Like Dr. Crouse, I have sometimes been laughed at for prescribing quinine. I once filled a large cavity in a molar tooth; an unusually severe operation. There was no pain for several days after the operation; but later there was pain each day at about 4 o'clock, P. M., coming on suddenly, with severe throbbing, and subsiding gradually. I was satisfied that the pulp was in pretty good condition, and prescribed two-gr. pills of quinine every hour till well under the impression of it. There has never been a recurrence of the pain, and the pulp is still alive. I gave it without much certain knowledge as to the exact mode of its action, but hoped for its anti-periodic effect, and have often used it since with good results.

DR. PATTEN: A lady came to our town who had spent a great deal of money and taken a great deal of trouble for the treatment

of sore eyes. The doctor brought her to me to see if there was anything the matter with her teeth. They appeared to be very good, but I was anxious to find *something* the matter with them, and after careful search succeeded in probing an exposed pulp through an obscure cavity in a wisdom tooth. The removal of this tooth cured the sore eyes.

DR. CUSHING: I have prescribed quinine in three cases that occur now to my mind, in which relief was immediate and complete, and in other cases with modification of the trouble. I have given it only in cases when I suspected malarial trouble.

DR. TOWNSEND: An old lady came to have four or five loose under front teeth removed, all that remained in her mouth. Their extraction was followed by severe *periodical* hemorrhage, recurring at the same time every day. I used persulphate of iron, and prescribed quinine, beginning five or six hours before the period. The hemorrhage recurred, and they sent for me, when I found that the quinine had not been taken. I made her take it the next time, and there was no after recurrence. In another case, a lady very hard of hearing came to have a lower wisdom tooth filled on the buccal side. I found the tooth very sensitive. Obtunding the sensitiveness by means of oil of cloves and morphine, was followed by immediate recovery of hearing.

AMERICAN DENTAL ASSOCIATION.

REPORT OF SECTION FIVE ON PHYSIOLOGY.

BY M. S. DEAN, CHAIRMAN.

THE ORIGIN OF THOSE NESTS OF DENTICLES GENERALLY DENOMINATED "DENTIGEROUS CYSTS."

Although I have given considerable thought to this question, I do not claim that I have solved it with absolute certainty; but will give the conclusions to which I have arrived, and the histological and physiological facts upon which they are based.

In glancing over the literature upon this subject, I find the only histological account of these anomalies, of any value, is recorded in the Transactions of this Association for the year 1875. The mode of the *origin* of these abnormal productions, as there presented, is

not, however, in accordance with well-established anatomical and physiological facts. And yet the theory was an ingenious one, and the suggestions it contained pointed very nearly in the right direction. The great initial error in the theory there advanced was in regarding the tooth-germ as a single cell, instead of an aggregation of cells. It was suggested in that report that a tooth-cell (or, "mother-cell," as it was there termed), might, in an abnormally active condition, generate other tooth-cells; and from the latter these dwarfed teeth might originate.

I submit the following facts, as the foundation of the theory I am about to offer:

1. That the teeth are developed from two distinct histological elements; the enamel from the epithelium or *epiblastic* layer; the dentine from the dermis or *mesoblastic* layer.

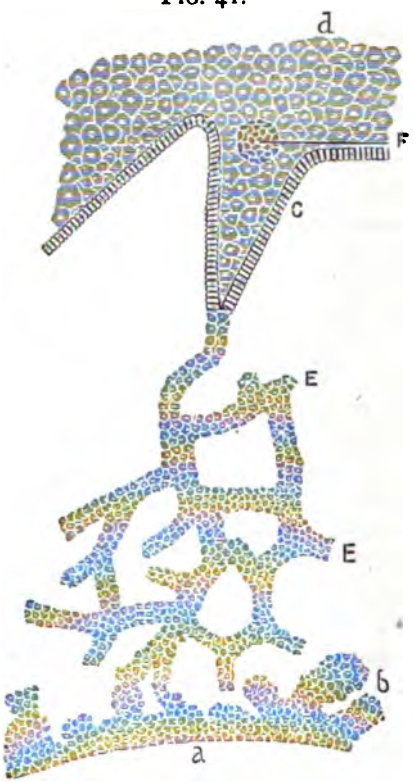
2. That the enamel organ becomes largely developed before the slightest trace of the dentine papilla makes its appearance. Indeed, there are many facts that tend to establish quite conclusively the theory that the development of the papilla is induced by and through the presence and influence of the *epithelial* body, constituting what is denominated the enamel organ. Keeping these facts in view, let us look at a few histological facts, which are familiar to all embryologists who have examined the fœtal jaws during the later stages of intra-uterine life. Upon examining subjects, soon after the rupture of the epithelial cords is effected (cords which up to this time had connected the dental follicles with the epithelial layer of the mucous membrane), large masses of epithelial cells will be found attached to their extremities; and sometimes detached aggregations of these cells are found scattered in various directions in the embryonal tissue *

These epithelial proliferations vary greatly in quantity, and usually disappear before the teeth (from the cords of which they originated) are fully developed. I claim that under favoring conditions these epithelial masses may become enamel organs, more or less imper-

* These epithelial masses have been noticed by many histologists. By Serres they were believed to be *tartaric glands*. They have been observed by Magitot and Kolliker, but these writers have not assigned to them any physiological significance; Kollmann, however, claims that the enamel organs of the supernumerary teeth are developed from an accumulation of these epithelial bodies.

fect, it is true; and that these enamel organs may induce the development of corresponding dentine papillæ; and also that these two organs may pass through all the successive phases of development that occur in the evolution of the normal dental organs. The magnitude of these abnormal teeth, and the perfectness of their structure, must depend upon the volume of the epithelial masses which constitute each individual enamel organ, and upon the nutritive supply that may be furnished to them. It is not necessary for me to elaborate this idea further. I will, however, direct attention

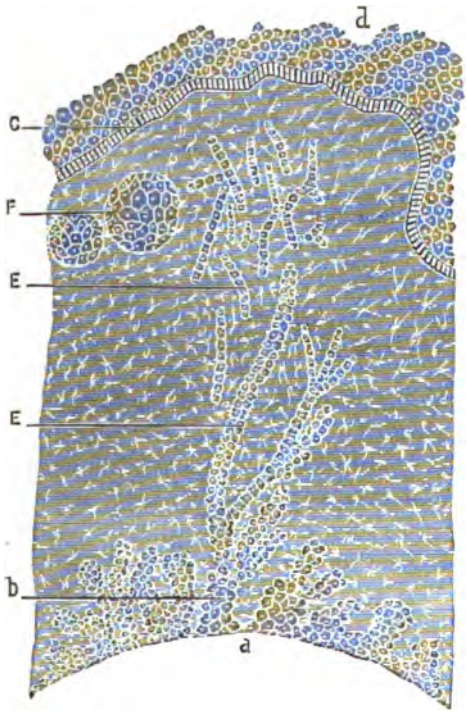
FIG. 41.



b, Epithelial buddings upon the follicular wall; c, columnar layer of the oral epithelium; d, oral epithelium; E, E, *debris* and buddings of the cord; F, epithelial globule in the epithelial *lamina*.

to a few facts which I think corroborate this view. We find, for instance, that the development of the teeth is not confined to their legitimate territory—the maxillæ; but that they may be produced in various and remote parts of the system: the bladder, the scrotum, the vagina, the eyebrows, etc., and in the ovaries, which are the favorite seat of these anomalous growths. These are well-known facts; and these abnormal productions are admitted to result from the *epithelium* which has become invaginated in a fold of the mesoblastic layer; in other words, some epidermal cells have become

FIG. 42.



a, Segment of the follicular wall; b, epithelial buddings upon the wall; c, columnar layer of the oral epithelium; d, oral epithelium; E, E, *debris* and buddings of the cord; F, epithelial globules from the debris of the epithelial lamina, which in the report are supposed to furnish the enamel-organs of the denticles found in dentigerous cysts.

invested within the dermal tissue—circumstances which may more naturally occur in the tissues of the jaw than in the distant regions just referred to.

The histological facts alluded to in the above report are represented in the cuts here presented, which are taken from a treatise on the *Origin and Formation of the Dental Follicle* by Drs. Legros and Magitot.

Fig. 41 represents a section taken from the jaw of an embryonal calf, magnified 260 diameters. The cut embraces the region external to the dental follicle (a) which latter is not shown in the figure.

Fig. 42. Section taken from an embryonal calf, and embracing the same territory represented in fig. 41. Magnified 100 diameters.

DISCUSSION.

DR. PIERCE: I regret my inability at the present time to present to the Association a synopsis of the labors of the German histologists during the past year upon cell development, for I understand that much in that direction has been accomplished. I take great pleasure and intense satisfaction in bringing to the notice of the Association a work from the hands of the chairman of the section, Dr. M. S. Dean, on the "Dental Follicle," advance sheets of which I have had the honor of reading. It is a translation from the French authors, Drs. Legros and Magitot. I would warmly commend it to all of those who desire to become familiar with the origin of the tooth-germ and its subsequent development. It is especially adapted to the student by the familiar, conversational style in which the translator has presented it It is, indeed, a book that every earnest seeker after truth concerning this complex portion of the human economy must possess.—[*Trans. Am. Dental Ass'n.* 1879.

JOURNALISTIC.

The "Independent Practioner' for April has a very suggestive article on "Tooth-Caries of Pregnancy—Its cause and Treatment," by Dr. E. C. Kirk. He gives the following history of a case in his practice: "Up to the time of her marriage the teeth had been of

good quality, rarely requiring the services of a dentist. During the three years following marriage she gave birth to two children; she also suffered much from toothache, and had two of her teeth extracted. About this time her other teeth were put in perfect order by a thorough and conscientious operator. Again she became pregnant, suffering as before with her teeth; some of the fillings dropped out, and a number of new cavities appeared. The teeth were sensitive and chalky, and the decayed portions of that "peculiar cartilaginous character which indicates a loss of the mineral portions of the teeth."

The cause of this dental degeneration is found in the "excessive demand * * * made upon the system of the mother for the lime-salts necessary to the formation of osseous structures of the fœtus." He believes "much can be done to avert this wholesale destruction." To this end, "food, rich in lime combinations," should be supplied, to which may be added soluble preparations, "such as the lactophosphate or hypophosphate." He has observed that in a large number of women the so-called, "morbid craving" is "for articles of a mineral character—as chalk, slate-pencils, lime, plaster, whiting, etc." One case indulged freely in a mixture of whiting and water; another in plaster and whitewash, picked from the wall.

The June number contains "No Battery in a Tooth," by Mr. Chas. Mayr, which calls for a reply on the part of Dr. H. S. Chase. The author, who claims to be "a specialist in practical chemistry and electricity," repeated Dr. Chase's experiments, as detailed in the paper noticed in this department last month, and obtained the following results:

"1. Experiments with plugged cubes are absolutely incomparable with each other, if not verified and compared with the results obtained with an unfilled cube of the very same tooth.

"2. Different teeth and cubes made thereof lose very differently in the same acid, in the same time, without any visible difference in their structure.

"3. That the drying before and after immersion has to be done very carefully in a water bath."

The results of his experiments make a widely different showing

from those obtained and published by Dr. Chase. The reader may judge for himself:

	Dr. Chase's experiments.	Mr. Mayr's experiments.
Gold filled cube	+ 17 per cent.	—0.9 per cent.
Amalgam	+ 10 "	+ 1.9 "
Gutta percha	—00 "	+ 1.3 "
Oxychloride	— 3 "	—1.9 "

The "Dental Register" for April and May is pretty heavily weighted with "addresses." Dr. M. S. Dean, of Chicago, delivered one before the graduates of the Ohio College, and a remarkably good one too—one that might serve as a model to some who are invited to "perpetrate" these things on the inoffensive victims who grace front seats. The second is by President J. S. Cassidy, of the Mississippi Valley Dental Association. The third, by Dr. J. A. Robinson, before the graduates of the dental department of Michigan University. All of these gentlemen are "well read." Dr. Dean goes into general literature; Dr. Cassidy but rarely goes beyond medicine and certain collateral sciences; Dr. Robinson draws largely on the "Good Book," quoting like a professor.

EDITORIAL.

THE NEW YORK MEETING.

The desirability and propriety of concentrating the representative bodies of the dental profession in this country into a single organization cannot, we think, be doubted. The only question that arises is, how, under existing circumstances, can it best be done. We have two representative bodies in existence, and a third, not representative, but claiming to possess national characteristics which entitle it to be regarded as the co-equal of the others. It is certainly *not* desirable that this triple arrangement should continue. What then shall be done? It has been proposed that the three bodies dissolve and unite in the formation of a new one. This is objected to by one of the bodies on the ground that it is now working so well and performing such important uses that it is well satisfied with itself and

desires no change. This is certainly true, so far as its jurisdiction extends, for it is not denied that it attracts but a meagre support from an important section of the country and does not have the undivided support of all the elements found in its own proper territory. Hence the argument that it is not as fully national as an association might be, is well founded and not easily denied. But it is claimed in its behalf that this condition is not of its own creation and that its doors are open and are wide enough to admit the whole nation. This again is true, and still there exists some obstacle which prevents the "consummation devoutly to be wished." In what does the hindrance consist? It has been frequently urged that its meetings are usually, if not always, held north of a certain line of latitude, and also that it is controlled by a certain set of men, who play into each other's hands, and who studiously exclude all others from participation in its management. The reply to these indictments is: 1st. That the time of year at which its meetings are held restricts its assemblages within certain climatic limits, and 2d, that the officers are chosen by a majority of the body, and the way to change the administration is to add a sufficient number to its membership to give a majority in favor of other candidates.

This statement of the case brings us no nearer the solution of the difficult problem than we were at the beginning. The reason for this, it seems to us, is that it is doubtful if there is any practicable solution attainable at this time. The time of the year when the American Dental Association holds its meetings is no doubt the most convenient one for the practitioners of all or nearly all the States, and that time is not suitable for such assemblies in the warmer latitudes of the United States.

The city of St. Louis has several times been proposed as the place of meeting, but the question of probable temperature in August has heretofore turned the scale against it. Without conceding that St. Louis is any warmer, or more uncomfortable in any way, than Cincinnati, Philadelphia, Washington, and we might add New York, the members of the Association resident in St. Louis have cheerfully acquiesced in the decision of the majority and have made their annual pilgrimage to whatever spot the majority has designated as the professional Mecca.

In view of all the circumstances we do not see how the object

sought to be attained can be accomplished at present. If it cannot be done, we should advise the Southern (now National) Association and the American Dental Convention to unite and form one body. Two bodies would surely be less objectionable than three, and the future union of two would be found less difficult than the present union of three.

One of the proposed features of the proposed new organization deserves, we think, careful consideration. We allude to the provision that only State societies should be entitled to representation. There are some societies that are not limited to States, others that do not conform to State lines, and others that include parts of a State. Would it not be a wiser plan to admit, besides State societies, any society having a certain membership, irrespective of its geographical boundaries? Let the convention answer.

REMOVAL.

Messrs. Alex. Heburn & Co. have removed their dental depot to 919 Olive Street, 2d floor.

SOCIETY NOTICES.

CALL FOR A MASS CONVENTION OF THE DENTISTS OF THE UNITED STATES TO ORGANIZE A NATIONAL DENTAL ASSOCIATION.—At their annual meetings in 1879 the Southern Dental Association and the American Dental Convention each appointed a committee invested with full power to adopt measures for the formation of a National Dental Association. The American Dental Association at its meeting in the same year appointed a committee to confer with these two committees on this movement and report to the Association at its meeting in Boston, August 3d, 1880. Members of these committees met at Saratoga in August, 1879, and elected Professor J. Taft, General Chairman.

The committees are as follows: *Southern Dental Association*—R. Finley Hunt, Chairman, Washington, D. C.; T. T. Moore, Columbia, S. C.; S. J. Cobb, Nashville, Tenn.; T. S. Waters,

Baltimore, Md.; J. R. Walker, New Orleans, La.; F. J. S. Gorgas, Baltimore, Md. *American Dental Convention*—R. B. Winder, Chairman, Baltimore, Md.; J. G. Amber, New York, N. Y.; F. A. Levy, Orange, N. J.; J. Taft, Cincinnati, O.; F. Y. Clark, Saratoga, N. Y.; E. S. Hurlbut, Springfield, Mass. *American Dental Association*—A. W. Harlan, Chairman, Chicago, Ill.; C. N. Pierce, Philadelphia, Pa.; F. H. Rehwinkel, Chillicothe, O.; H. J. McKellops, St. Louis, Mo.

A meeting of chairmen was held in New York, May 11, 1880, at which were present Professor R. B. Winder, Dr. R. Finley Hunt, and Professor C. N. Pierce, the latter representing (by proxy) Professor J. Taft, General Chairman. Professor Pierce was also present as a member of the committee of the American Dental Association.

This meeting, in accordance with the powers and duties intrusted to the committees, decided to call a Mass Convention, and fixed the time and place of meeting, Wednesday, August 11, 1880, at 11 o'clock a. m., in the City of New York, for the purpose of organizing a National Dental Association, to be composed of members of every State society in the country.

A constitution and all necessary regulations will be prepared by a sub-committee, and submitted for revision to a meeting of the full committees, to be held in the same city at 9 o'clock a. m., on Monday, August 9, 1880, at Sturtevant House, so as to be thoroughly prepared for the action of the mass convention.

The importance of this measure requires that the whole time of the convention shall be devoted to the business of organization.

All members of State Societies and Associations, and those intending to become members, are cordially invited to be present at this mass convention, and take part in its proceedings.

As this proposed National Association is intended to promote the best interests of the whole profession of the country, it is important and is especially urged that every State in the Union be represented by as large a number of dentists as possible.

It is hoped, therefore, that *every* dentist in the country who can *possibly* go to New York at that time will be present.

The following Executive Committees have been appointed to act together and make all arrangements for this meeting, such as procuring a hall, hotel accommodations, reduction of railroad fares, etc.:

By American Dental Convention—J G. Ambler, New York, N. Y.; Charles Merritt, New York, N. Y.; H. Townsend, Philadelphia, Pa.; J. H. Smith, New Haven, Conn.; E. D. Fuller, Peekskill, N. Y.; G. A. Mills, Brooklyn, N. Y. By Southern Dental Association—W. H. Atkinson, New York, N. Y.; S. J. Cobb, Nashville, Tenn.; J. W. Selby, New York, N. Y. By New York State Dental Society, to co-operate with other committees—O. E. Hill, Brooklyn, N. Y.; L. S. Straw, Newburgh, N. Y.

J. TAFT,
General Chairman.
R. B. WINDER,
Chairman Committee of A. D. C.
R. FINLEY HUNT,
Chairman Committee Southern Dental Association.
F. A. LEVY,
General Secretary.

NATIONAL DENTAL ASSOCIATION.—The Executive Committees of the National (late Southern) Dental Association, of the American Dental Association, and of the New York State Society, would respectfully announce to the dentists of the United States that they have made ample provision for the reception and entertainment of all dentists, whether alone or with their families, who will visit New York at the time of the assembling of the Convention, from August 9th to 14th. The following hotels are recommended as being favorably situated for the convenience of the dentists: Sturtevant House, Broadway, near 29th street; Coleman House, Broadway, near 28th street; Continental Hotel, corner Broadway and 20th street; Rossmore Hotel, corner Broadway and 42d street; Grand Central Hotel, Broadway and 3d street. The above hotels will accommodate guests with rooms at the rate of $1 per night for each person, and $2.50 for room and board for each person. Parlors have been offered at the Sturtevant House, Coleman House and Continental for the use of the committees. On and after the morning of August 9th, a committee will be in attendance at Sturtevant House for the purpose of giving visitors information on all points connected with the convention.

The railroad excursion arrangements by the lines from the East,

and Northwest are so ample and the rates so low, that it was ecessary to make special arrangements.

om Southern points the excursion rates to New York and re- will be as follows: Norfolk, Va., by steamer, $14; Charleston, by steamer, $25; Augusta, Ga., via Charleston steamer, $30; nbia, S. C., via Charleston steamer, $30; Atlanta, Ga., via leston steamer, $40.35; Macon, Ga., at the rate of 6c. per one way, to Augusta, thence by Charleston. Other railroad not yet arranged for will be reported through the presidents of everal state societies.

ere will be several excusions given by the dentists of New and vicinity, in which all visiting dentists are invited to parti- e with their families, which will, without doubt, add to the ure of the meeting. F. A. Levy, General Secretary.

IE twelfth annual meeting of the Pennsylvania State Dental ty will be held at Bellefonte, Centre county, Pa., commencing day morning, July 27th, at 10 o'clock, and continuing three . G. W. Klump, Corresponding Secretary.

HE tenth annual meeting of the Wisconsin State Dental Society be held at Arion Hall, in the City of Milwaukee, for three days, mencing Tuesday, July 20, 1880. M. T. Moore, Secretary.

CALL has been issued to the dentists of Southern Kansas and hwest Missouri to meet at Carthage, Mo., on August 17th, for purpose of organizing a Southwestern Dental Society.

ARVARD ODONTOLOGICAL SOCIETY.—At the second annual ting of the Harvard Odontological Society held on Teusday, 6th, 1880, the following officers for the ensuing year were elect- President, Dr. E. B. Hitchcock; Recording Secretary, Dr. J. V. Werner; Corresponding Secretary, Dr. E. S. Niles; Treas- , Dr. F. Perrin; Prudential Committee, Dr. J. G. W. Werner, Dr. D. F. Whitten, Dr. F. E. Barfield. The annual address was delivered by Dr. E. B. Hitchcock. A paper on "Reflex Action" was read by Dr. E. S. Niles and one entitled "Reminiscences" by Dr. Ferrin. The society adjourned till the 3d Tuesday in September next, to meet at the residence of Dr. Niles, 146 Boylston street, Boston, Mass.

ERRATA.

On page 358, third line from top, read "carbolic" for "carbonic." Same page, same line, omit comma after "calcis."

PROGRESS.—A hospital department, with free beds, has been added to the Oral Surgical Clinic of the Philadelphia Dental College, under charge of Prof. J. E. Garretson.

BOOK NOTICES.

A TEXT BOOK OF PHYSIOLOGY. By M. FOSTER, M. A., M. D., F. R. S., Prælector in Physiology and Fellow of Trinity College, Cambridge. From the third and revised English edition, with notes and additions, by ED. T. REICHERT, Demonstrator of Experimental Therapeutics, University of Pennsylvania, with two hundred and fifty-nine illustrations. Philadelphia: H. C. Lea's Son & Co., 1880. St. Louis: Hildreth Printing Co. $2.50.

We have previously noticed Foster's Physiology, English edition, and gave our views of its many excellencies at that time. We have now an American edition, with an addition of about one hundred and forty pages, made by Dr. Reichert, the American editor. This edition also contains upwards of two hundred and fifty illlustrations. These additional features adapt the work more fully to the wants of our schools, and render it, in our opinion, the very best text-book on physiology extant.

This is emphatically a pictorial age, and object teaching is being employed to advantage in the higher as well as in the lower departments of education. The large increase of illustrations in the American over the English edition, places the work upon a level in this regard with the larger and higher priced works which have long been in general use in this country. The advances that are constantly being made in physiological knowledge makes frequent revisions of our text books on this subject necessary in order that students may receive the full benefit of these discoveries. The former high cost of these works has been a serious tax upon medical and dental students, and we are pleased to note any lessening of this financial burden. Many practitioners have declined to renew their works on physiology for the same reason, and hence have not kept pace with the modern advances that have been made in this branch of anthropology.

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[Continued from July number.]

MINUTES OF TRANSACTIONS OF THE SIXTEENTH ANNUAL MEETING OF THE ILLINOIS STATE DENTAL SOCIETY.

BY EDMUND NOYES, Secretary.

TREATMENT OF TEETH WITH DEAD PULPS AND ALVEOLAR ABSCESS.

BY DR. C. R. E. KOCH, OF CHICAGO.

Having at a very late day been asked to prepare a paper to be read before this society, and having very foolishly, though reluctantly, consented to do so, to help the executive committee out of a scrape, I will endeavor in liquidation of that promise, to give you something which may serve as a starting point for discussion. My time and attention has been so much occupied of late with matters of various kinds, that it was impossible for me to prepare an essay.

If there are those among us who doubt that our profession has progressed in knowledge within the last twenty or twenty-five years, let them pause and compare the treatment of these cases referred to in the title of this paper, now, with that generally in vogue at that time. Then, an essay upon this theme might have been written very

briefly in two words, *extract them*, and would have met with the endorsement of the large body of the profession.

If now these cases are restored to usefulness, a great benefit is conferred upon humanity, and to do this with the least amount of suffering to the patient should be the aim of conservative practice.

It is true that failures in these cases sometimes occur to perplex and annoy us. Now and then a case may not progress just as we may wish or expect. In spite of precautions taken, our patient may call sometimes with an eye all but closed by a very much enlarged and rubicund cheek, and accompanied by a temper akin to that of a Sioux on the war path, exhibited in accents neither mild nor polite. Let us not be discouraged by such cases, but be all the more earnest in determining to know just what has caused this result and be careful to avoid a *faux pas* of the same nature, if it may seem that the untoward condition was the result of mistake or neglect of ours. Sometimes such a result may occur, however, from causes far beyond our reach or recognition.

We may say it as a maxim, that all teeth with dead pulps in them, irrespective of the cause which destroyed their vitality, and regardless of whether they have produced annoyance, pain, periostitis or abscess, and whether decayed or not, should be treated; always provided that we have unmistakable evidence that the pulps are dead.

We might lay down the following general rules for the treatment of these cases:

First, cleanse the tooth and free the gum around it *from all irritating substances.*

Second, *Open the pulp-chamber allowing any gases that may arise from decomposition to escape, and cleanse it and the root canals as thoroughly as possible.*

The opening into the pulp chambers should always be made at a point where it will least weaken the tooth structure, that will give the most direct and free access to the introduction of the broach, medicaments and light, and that shall, when again filled up, least disfigure the tooth.

The practice of drilling holes into teeth that give indications of the presence of a dead pulp at right angles to their longitudinal axes and leaving these open, it is to be regretted is not yet obsolete. It

is only rational treatment in part, and renders a permanent cure absolutely impossible.

True it permits the escape of gases arising from the decomposition and prevents their accumulation within the confined space, and consequent pressure upon and inflamation of the surrounding tissue, but it renders utterly impracticable the removal of the dead organic matter which, if done, would prevent the generation of these mephitic gases and hence preclude the necessity for an escapement flue, which latter must always be a nasty catch basin, in which are collected the tooth-destroying elements.

Third, *Do not plug up the canals tightly until you feel sure that there is no longer any danger from the formation of mephitic gases, and the pressure produced by their confinement within the walls of the canals.*

The opening having been effected and the broken down tissue removed as thoroughly as possible, the walls should be thoroughly disinfected. Creosote, carbolic acid, or proof alcohol, will be all sufficient. If there has been pain, or soreness of the tooth, iodine should be freely exhibited in combination with the disinfectant, but unless an abscess has already been formed great care must be taken to introduce these remedies gently and without force. If introduced upon a broach with cotton, this should not be wound so tightly as to form a piston in the root canal.

Sometimes, indeed, it may be necessary in the treatment of these cases, in which there seems to be an indolent, sluggish periostitis which does not yield to the resolvent iodine treatment, to bring about an acute abscess, and there is no quicker way to produce it than to plug up the roots tightly.

The roots having been thoroughly disinfected, the tooth is given a trial, a little loose cotton being left in to prevent the ingress of other substances. It is rarely safe to seal up a tooth of this kind at the first sitting, and especially in cases where pulps have been dead for a long time, without giving patients any uneasiness; great care must be observed to avoid irritation of this nature. After a probationary period of a few days the cavity may be sealed up and the tooth again put upon probation.

Fourth, *Being satisfied that the root is ready to receive the filling, it should be filled with an indestructible material, which is sure to be carried to the apex of the root, and leave no open or air spaces along the walls.*

The tooth having stood the test of being tightly sealed up for three or four days, or more, without any untoward signs, we may proceed to fill the root.

Most any substance employed for filling teeth is good enough in straight and regular shaped root canals, but in flat or compressed roots with tortuous canals, where it is at times impossible to know just what the broach has effected, there is nothing more adequate than gutta percha dissolved in chloroform. This should be pumped into the canals, after which a brief time should be allowed for the separation of a portion of the chloroform, which may be hastened by blowing a warm blast from the air syringe into the cavity. A piece of warmed gutta percha should then be crowded into the cavity until the root canal is filled. Another probationary period should then intervene before permanently filling the cavity over this. It is believed that this material will come nearer to being a perfect root filling than any other in these cases, because it can be carried with reasonable expectation of success to every part of the canals, and if any particles of the pulp should have escaped removal by reason of inaccessibility, it would be rendered impotent for mischief by reason of its becoming encased by the gutta percha solution. Of course in cases where there is an enlargement of the foramen it would not be a suitable filling.

Fifth, *Never fill a tooth permanently until a sufficient length of time has elapsed since filling the root to leave a reasonable chance for expecting no evil results from the operation.*

Sixth, *Have the patient to understand that the treatment of these cases of teeth with dead pulps in them are not simple, and that while there is no probability there is still a possibility of an abscess and suffering before the tooth shall be restored to usefulness.*

In this consideration of the subject of dead pulps we do not consider pulps destroyed by ourselves as a necessary act, as in these cases there is generally no treatment necessary after the extraction of the pulp and before filling the root, although it is well even in such cases to defer the completion of the operation to another sitting.

Where the dead pulp has been allowed to go on in its mischief until periostitis has resulted in acute abscess, the pus should be carefully discharged through the opening in the tooth, and sufficient time should be allowed to have every particle drained off. When satisfied

that no more is forming, which sometimes may take a week or more, creosote or carbolic acid and iodine should be forced into the canals so as to pass into and bathe the walls of the abscess, after which the the case should be treated with the same caution already spoken of.

When abscess has become of long standing, and has established a fistulous opening upon the soft fissures through the alveolus, it is generally very easily cured. In such cases, after removal of debris from the root or roots, these should at once be injected with creosote and iodine, or carbolic acid, and if a free flowing of the medicine can be effected through the root and fistula, one application is generally sufficient, and the tooth may then be filled without much more treatment.

Occasionally we meet cases of this kind that, however, seem obstinate and do not yield to treatment readily, owing to the difficulty of forcing the remedies through the canals as in anterior roots of some lower, and buccal roots of upper molars. In such cases the medicine should be introduced through the fistula by means of an abscess syringe and the sulcus broken up. Generally these cases will yield to the remedies mentioned, but sometimes the aromatic sulphuric acid may be employed to good advantage.

Cases which do not yield to the treatment described occur sometimes, owing to the roughened and irritating condition of the apex of the root, which from long-continued bathing in the vicious secretions has become eroded; such cases call for surgical treatment, and may be met by trephining through the alveolar plate and excising the affected portion; or, by extracting the tooth, excising the end of root involved, polishing and replanting the tooth. These operations will not often be consented to by patients, and are only warranted in extreme cases.

DISCUSSION.

DR. CROUSE: The treatment of pulpless teeth requires great care. Many acute abscesses result from improper or insufficient treatment, but they will seldom arise if such teeth are properly treated. It is a simple matter if sufficient caution is used and we go slow enough. After opening, leave them open without treatment for awhile, except to cleanse the root canals thoroughly. Sometimes I use only alcohol at the first sitting. Forcing creosote

into them at first may clog the foramen and amount to the same thing as plugging the cavity. In front teeth there is not so much difficulty, but if there are small or crooked root canals, great caution is necessary. Repeated treatment every few days is often desirable, or if they *are* stopped up, leave them so as to have the stopping easily removed, and instruct *positively* to remove if necessary.

The paper did not say anything about bleaching. It is a great mistake to leave a conspicuous front tooth disfigured by discoloration when it may be so much improved by bleaching.

The treatment of most cases of abscess is simple. I use a piece of pure rubber as a piston for forcing creosote and hardly ever fail to get the medicine through the apex of the root, and the fistula, if there is one.

Dr. Matteson asked how he would bleach, and if he would do so for a patient so young as ten years old? Dr. Crouse replied that he would plug the apex of the root and then use Labarraque's solution with alum to liberate the chlorine more freely. Would use nitric acid in extreme cases.

DR. MATTESON: Would you use such strong applications in so young a tooth?

DR. CROUSE: I would sooner do so than leave them black.

DR. SWAIN: One thing is left out of the paper that ought to be noticed. The use of creosote when there is pus about the foramen will often coagulate it so as to clog the foramen and cause trouble, but after the creosote has spent itself, if the foramen is opened with a fine probe it will then remain open.

DR. NEWKIRK: A word of caution is proper in reference to the use of some of the agents mentioned. The paper advocated pumping gutta percha and chloroform into root canals for filling them. Chloroform is very penetrating and an intense local irritant, and may cause pain and soreness by getting through the apex of the root. Carbolic acid and creosote in full strength may sometimes do harm. The first requirement in abscess is to give free vent, and then nature will often effect a cure. Glycerine has also the quality of penetrating readily and is preservative and not irritating. It is an excellent dressing for some cases.

DR. CUSHING: The points stated by Dr. Newkirk may be theoret-

ically correct, but they are not so practically. The chloroform and gutta percha solution used as a root filling never acts as an irritant in that way. If there is any irritation it is momentary and quickly passes away.

I think the same may be said in respect to the danger of harm from the use of creosote and carbolic acid. In an extended experience I have seen no ill effects from their use, though, of course, there may be danger from *over treatment* with anything.

DR. BROPHY: I would first open the pulp chamber and canals and wash with water, then would disinfect with chlorine in some form. I would leave some in there and seal up the cavity and would see again in two or three days, or sooner if there were pain, then would use carbolic acid. The chlorine destroys the products of decomposition, and then the creosote will arrest further decomposition. If there is abscess, further treatment will be necessary, not inside the tooth but outside, to be accomplished either through the tooth or through a fistula. If there is a fistula the treatment described by Dr. Crouse is usually proper and sufficient, but if there is caries or necrosis the treatment must be further extended and more complicated.

DESCRIPTION OF DRAWING EXHIBITED BY G. V. BLACK, D. D. S.

Dr. Black introduced the following illustrations of the various forms of alveolar abscess, and abscesses of the face and mouth, painted on a black ground, in water colors and India ink.

UPPER JAW.

No. 1. A normal incisor, with its alveolar membrane, etc.

No. 2. Ordinary acute alveolar abscess.

No. 3. Ordinary chronic alveolar abscess.

No. 4. Alveolar abscess with ostitis, with the pus between the periosteum and the bone.

No. 5. Alveolar abscess with ostitis in the roof of the mouth.

No. 6. Chronic alveolar abscess discharging into the nose.

No. 7. Blind alveolar abscess.

No. 8. Treatment of alveolar abscess in the upper incisors.

LOWER JAW.

No. 9. Ordinary acute alveolar abscess of the lower incisors.

No. 10. Ditto—chronic.

No. 11. Alveolar abscess with ostitis.

No. 12. Chronic alveolar abscess with fistula following the periosteum to the lowest point of the bone and opening under the chin.

No. 13. Chronic alveolar abscess with fistula perforating the lower jaw bone and discharging under the chin.

No. 14. Bones of the face in India ink illustrating loss of bone by necrosis resulting from alveolar abscess with ostitis.

No. 15. Lower maxilla, showing fistula perforating it, resulting from a spicule of dead bone left in a tooth-socket after extraction.

No. 16. Lower maxilla, showing absorption of bone about the roots of the teeth from alveolar abscess.

No. 17. Bones of the face, showing necrosis with the loss of bone reaching nearly to the orbit; opening the antrum and loss of four teeth.

No. 18. Perpendicular lateral cut through the eyes, nose, antrum of Highmore and the second molar teeth.

No. 19. Ordinary compound alveolar abscess of the molar teeth (from more than one root).

No. 20 *a*. An ordinary chronic alveolar abscess opening in the roof of the mouth.

No. 20 *b*. Alveolar abscess of the molars complicated with ostitis.

No. 21. Alveolar abscess discharging on the cheek (sectional view).

No. 22. Face view of No. 21.

No. 23. Treatment of No. 21.

No. 24. Alveolar abscess opening into the antrum of Highmore.

No. 25. Bones of the face with bone cut away, showing the antrum of Highmore and the relation of the roots of the teeth to it.

No. 26. Necrosis of the temporal bone with fistula extending down beneath the molar bone and discharging upon the cheek.

Accompanying the exhibition of the pictures, the doctor gave a general description of each form, the symptoms, diagnosis, modes of treatment, etc.

Dr. Dean used Dr. Black's drawings to illustrate a case of abscess in a lower incisor with a chin fistula. This case was peculiar in that the fistula crossed the symphysis. The treatment proved to be very simple. The tooth was drilled near the top, with the right angle engine drill. The root was cleansed and creosote forced in, without result the first time, probably because the creosote did not go through, but the second attempt was successful and the creosote was forced through the fistula; after that the case was cured in a week without further treatment. I prefer to use a cone of tinfoil for stopping the drill hole after treatment in such cases as this, rather than Hill's stopping.

Dr. Kulp asked if creosote alone was as successful as creosote and iodine for the treatment of abscess?

Dr. Black replied that he never uses creosote and iodine together.

DR. KULP: I use creosote and iodine and if it goes through the fistula I fill the tooth permanently at once. I remove iodine stains with ammonia.

Dr. Crouse criticised Dr. Black's drawings on account of the preciseness with which the location of fistulas and the sizes and positions of cavities in the bones produced by abscesses were represented, and said he did not believe that in actual observation one could tell so exactly about such things, and objected to such *hypothetical* representations as being misleading to young men who would be discouraged when they found that they could not tell so exactly the precise condition of their cases. He thought there must be a very unusual number of cheek and chin fistulas in Jacksonville in order to have so many of them occur in one man's practice, within two or three years, as Dr. Black had described. Had himself seen but very few indeed.

DR. TALBOT: I am ashamed of the last speaker. When a man has taken so much pains to prepare such careful drawings and descriptions of actual cases occurring in his practice, it is an outrage to have their accuracy discredited and their value depreciated without any reason for doing so. Dr. Black has doubtless had such cases to treat, because his ability to do so successfully has become known. As to their being so very rare, at least one of them, and often more than one, can be seen every week at the Saturday clinic at Rush Medical College.

Dr. Talbot was cheered, and his rebuke to Dr. Crouse evidently carried the approval of the assembly.

Dr. Crouse replied that the young man was fresh from Rush Medical College, and doubtless in a hospital or infirmary such cases may be often seen, but was not aware that Dr. Black was connected with any such institution.

DR. MCKELLOPS, of St. Louis: There are few men who have been a long time in practice that will fail to have seen examples of all the classes of cases illustrated by Dr. Black. It is very wrong to bring a wholesale accusation of inaccuracy against such carefully made drawings as these.

DR. STURGIS: I think no harm has been intended by my friend, Dr. Crouse. Those who know him well know that he sometimes says more than he means, and is a little addicted to joking, but he was not courteous to Dr. Black.

We get along much better with abscesses than we used to, but I find some troublesome and obstinate cases. For these I have a radical treatment that is very effective, the only trouble being that most patients will not consent to it. The treatment is to extract the tooth, and then drill straight through it, so that I can hold it up to the light and *see* through it—so that I know it is *clean*—then fill and replant it. I have treated thirty-two teeth in that way, only one of which has been a failure.

DR. TALBOT: The essayist said that carbolic acid is the only thing needed for the treatment of abscess. In these cases there are two conditions: The decomposition of organic matter and the formation of sulphuretted hydrogen. The first object should be to disinfect the tooth—that is, to destroy the foul gases, which carbolic acid will not do, as it will neither decompose nor unite with them. It is better to leave such a tooth entirely open, and do nothing but cleanse it, than to use carbolic acid at first. After it has been disinfected, carbolic acid may be used to stop the decomposition.

What shall we do in cases of forming abscesses? Shall we leave the patient to suffer for three or four days, or shall we hasten the abscess? I would give such patients a prescription that is easily carried in the pocket, and to be frequently applied. One drachm each of tr. capsicum, chloroform and alcohol, to be applied frequently, on a piece of cotton, as often as the heat from its application

subsides. Twenty-four hours on an average will suffice to point the abscess. I would relieve pain in the meantime by means of hypodermic injections of morphine, or hydrate of chloral internally.

DR. HARLAN: Nothing has been said about treating teeth when the foramen has been enlarged by disease. If it is a front tooth it is often very desirable to save it, and treatment through the root sometimes fails, and it sometimes fails to cure by treatment through the gum after filling. I have succeeded in a few such cases by pushing through little pieces of lead and letting them work out to the surface; a cure followed their expulsion.

DR. BROPHY: To say that these drawings shown to us by Dr. Black are very admirable ones for the purpose, is only feebly to express my opinion of them. I have seen many cases during the past year or two of abscesses complicated in various ways with external fistula or necrosis, etc. One case came under my care in which an abscess at the root of an upper canine tooth was discharging upon the face at the infra orbital ridge. The cavity in the tooth did not reach the pulp chamber, and the real cause of the trouble had not been suspected during two years in which it had been treated by various physicians, being called necrosis at first and cancer at last, so that when I saw it the woman expected to die of it before very long. A careful examination showed this tooth to be dead, and after opening the pulp chamber water could be forced through the tooth so as to come out upon the face through the external wound under the eye. Treatment with aromatic sulphuric acid proved to be inadequate, and I finally operated surgically, opening freely through the gum and process over the root of the tooth, and finding a cavity in the bone as large as a hickory nut, with the root of the tooth standing free in it. I excised the end of the root with an engine burr, and filled it with gutta percha, forcing it through, and having free access to the end of the root outside so as to remove and smooth off what came through. I scraped the inside of the cavity in the bone to remove the carious portions, filled it several times with boracic acid, kept it cleansed and disinfected, and took care to keep the external opening free during several months that were required for the cavity to fill up with connective tissue.

There was constitutional treatment at first with elixir of quinine,

iron and strychnine, and after a week or so she took cod-liver oil and iron.

DR. K. B. DAVIS: We may sometimes fail to cure an abscess of long standing as quickly as we desire for lack of using enough creosote when treating it to fill the large cavity that may be present. A large majority of acute cases will be cured by one application, but in cases of long standing and having a large sac we may fail to bring the carbolic acid in contact with the whole inner surface of it, even though some of it may come out through the fistula, upon the gum.

A man once called at my office with a bad root of a lower molar. I advised its extraction, but he refused, saying that he would have it out if it troubled him. After two or three months I was called to his house and found he had been about two months with his jaws shut so firmly together that they could not be opened to admit the blade of a case knife, and there were three fistulous openings under the chin. The doctor had been poulticing them with oak bark and other astringents. I ordered a poultice of slippery elm, and put a wedge between the teeth, gradually forcing the mouth open, so that after about four days he came and had the roots extracted and of course got well.

I had one case of necrosis from abscess, which was of considerable duration. When I first saw it, many of the teeth had already been picked out, and about all that could be done was to order constitutional treatment and remove the sequestrum when ready. The whole lower jaw was taken away from the angle on the right side to the symphysis. The bone is deposited in the Museum of the Missouri Dental College. I afterward inserted artificial teeth upon the new tissues that grew in there.

Dr. Litherwood asked if it would be advisable to make an artificial fistula in case of an upper front tooth with blind abscess?

DR. SPALDING: Yes, and it is worth special attention in the treatment of many abscesses to make an opening into the sac or cavity at its lowest point so as to allow complete drainage of its contents. It will often happen that nothing else will be necessary. If the case is an upper front tooth the root may project into the cavity of the abscess and of course it cannot be completely drained through the tooth. I saw two lower teeth that had been treated for a year

and a half through the roots and had given constant trouble. They were drilled through the gum and process into the lower part of the abscess cavity and required no further treatment and no medication of any kind. Another similar case in a lower molar was treated in the same way with the same result.

DR. TAYLOR: The elements of success in the treatment of abscess are thorough work and patience and perseverance. In acute cases I would not wait for the formation of the abscess, but would open into it through the tooth or the gum for the purpose of alleviating it. It would be well if all of us would keep a record of the abscesses we treat during the coming year, and be ready to report the treatment and results at our next meeting. In many cases of pulpless teeth, if the roots are fine and crooked, I keep them on probation a good while. I have filled the roots of about fifty teeth with oxychloride of zinc, thirty-eight with cotton and creosote, or oil of cloves, and three with gutta percha, and I intend to watch the results as well as I may have the opportunity to do, and will report the results at a future time.

DR. GARDINER: If a patient comes with a very sore tooth, I believe it good practice to apply chloroform and aconite to the gum (for obtunding the sensibility and pain), and cut with a lancet through the gum to the process, and then go through the process with the engine drill to the point of the root; then drill into the tooth and cleanse that out. Sometimes it is impossible to drill through the canal so as to get through the foramen.

DR. NEWKIRK: When we have abscess threatening, and desire sleep and relief from pain, there is nothing better to give than about ten grains of Dover's powder in three doses, about one hour apart.

SURGERY IN DENTAL PRACTICE.

By DR. J. J. CRESWELL.

Modern writers have absorbed much valuable time and space to prove that our specialty was really coeval with the "first families of the earth." Perhaps vanity has had much to do with these speculative efforts, and a desire to trace our lineal descent from the very brain of the goddess herself, must be regarded as the hidden motive

for much of the prolific writing of the past. While nothing is ever wholly lost, and as the incomplete structure molds and crystallizes itself into new forms and new life, results of a far more practical nature are everywhere taking shape as each succeeding generation stamps its impress on the royal coin of thought. The Greek dialecticians and sophists, we are told, "spent their time in nothing else" than inventing puzzles for their neighbors, while the ancient gnostics, and the modern ones, too, have attempted to arrogate to themselves what little there is left of human knowledge. The hidden forces of nature are constantly revealing to us the beauty and harmony of the material world, while the intellectual faculties are silently moving on to more brilliant and useful results.

The alembic of the alchemist has long given way to inventions and discoveries that benefit the race, and though our age is eminently a practical one, there are yet many idols to be pulled down. The custodians of the sacred art of medicine, after long watching on the Mars' hill of conservatism, were unwilling to share its honors and emoluments with any, save the professed followers of Esculapius and Hippocrates, who for centuries could give no other or better reason than that of old, "*Great is Diana of the Ephesians.*" With the light of other days, they have gradually abandoned their idols, and to-day we find men of thought and intellectual worth separating themselves from general practice to assume superior responsibilities over some special department.

The universality of knowledge and the keen perceptive faculties of an educated public mind demand that those who now elect a special domain of medical practice shall be held most rigidly to a strict account of their stewardship, for no mediocrity of attainments will be tolerated where excellence alone is demanded.

The dental surgeon is far from being an exception, and just now is, and will continue to be, called upon to give proof of those high intellectual and professional attainments which his special calling has imposed upon him. The ever ceaseless, active tide of current events challenges him to enter the forum of thought and active life, and henceforth to cast his lot with those

"Whose very breath is agitation
And their life a storm whereon they ride to sink at last."

The general underlying principles of intellectual requirement, requisite to success in any profession, having now been hinted at, a more direct and searching analysis must reveal to us the special requirements necessary to the successful practice of dental surgery. If the general surgeon is required to know the anatomical structure and physiological action of each organ and tissue over which he presumes to exercise his art, how much more so is he whose special care is to preside over the intricate and delicate harmonizing of the various organs contained in the mouth? Yet so common are the ailments and necessities of this class of organs that some have denied to them altogether the dignity of surgical interference, claiming that the calling of the dentist is purely mechanical in its nature, and that the duty of attending to the teeth could as safely be given over to any other tradesman willing to accept the trust. With this class it is of no avail to point out the high, social, literary, and moral qualifications, the exact skill and professional knowledge requisite for the proper understanding of disease, and the speedy relief of pain. The utter fallacy of those who seek to substitute mere mechanical skill for the superior professional advantages of an honored and trusted dental surgeon, must be apparent to the most superficial mind. It is true also that some over modest or timid members of our profession have urged similar objections, claiming that notoriety or a certain pedantic vanity is the sole reason for claiming to be classed among the doctors. To those who are unwilling to step up higher and who still cling to their idols, the objection is, perhaps, valid; and pedantry, which has ever been regarded as the greatest enemy of true science, may suit their capacity just as well.

It took centuries for even the astute power of the Grecian mind to lay its idols in the dust, to banish its Januses and Apollos, as mere base and hideous creations, unworthy the respect and homage of men. The discovery of the shameful and oft-repeated quarrels of Olympus but told of the weakness and pointed out the work of mere powerless demi-gods. Let no one, therefore, despise the proper understanding of the ailments of those organs he has elected to preside over. A familiar example may be presented. An aching molar or incisor has been overworked or overtaxed in some way; it therefore proceeds to inflammation and consequent pain, causing more suffering to its possessor than even the wounds of glorious

war. What is to be done? To act intelligently and expeditiously, to give the diagnosis and prognosis of the disease, to seek to restore to life and health and usefulness a useful member of the human body, should be the work of constant attention on the part of every educated dental surgeon. On the other hand, ever since the days of Draco, barbarity and ignorance have sought to enforce their cruel code of killing off the weak and infirm by substituting "survival of the fittest" for the Divine ideal, "I came not to destroy, but to save."

It seems to me that if the old law of retributive justice was again enforced there would be a considerable diminution of those who violate justice and deliberately boast of their prowess in carrying out the cruel and ignorant code of their savage prototype, in killing off the weak and feeble. There are so many truths to be gathered from the great storehouse of nature, that our lives are too brief to investigate properly the various phenomena around us, and therefore both wisdom and economy teach us that the calling or profession that each may select, must henceforth be the object of his most special care and devotion. What more inviting field to the dental practitioner than the study of the various organs, tissues and systems over which he is daily expected to preside? Let the facts and evidences of daily professional life record this truth, that the thorough knowledge of the anatomical structure of each organ in the human body, together with its action both in health and disease, as well as the *rationale* to be observed in management and cure, is as surely demanded and as rigidly exacted of the dentist of to-day as it is of the general practitioner of medicine and surgery.

And why? Not for the purpose of entering the active arena of competition, neither for the vain purpose of pedantic effect, but simply because no man can show profound respect, devoted, earnest attention to a profession, when he is entirely ignorant of its principles. It is recorded of a shepherd who had some local fame as an occulist, that being persuaded to attend the university for some years, and there learn the delicate and intricate structure of the human eye, he could never after be induced to operate on that sensitive organ. His profound knowledge and consequent respect for that delicate member made him more than ever distrustful of his ability, even with superior scientific attainments. While it

is admitted to be a crime against our common humanity to needlessly deprive a fellow being of even one of the least of those useful members, the teeth, the penuriousness of some and the want of proper information on the part of others have led, and are daily deceiving many to sacrifice those priceless native charms which no polished gloss of simulating art can restore. If the members of the dental profession fail to do their duty, a grave and lasting stigma must rest upon their fame.

The captious and impatient of restraint will find fault with your firmness and perhaps "walk no more with you" as the penalty of your loyalty to conviction.

> "Better roam for aye than rest
> Under the impious shadow of a roof unblest."

Gentlemen, it is doubtless wearisome to you who attend so faithfully these meetings, to hear these truisms so oft repeated, and that, too, at a time when so much valuable clinical demonstration is available. In the hope that if there be a single thought implanted that will move its possessor still onward and upward in the dignity of his profession by pointing to the royal road of science, leading from the mount of knowledge, through the beautiful vales of scientific culture, to eminent professional success, the time will not be wholly lost. The noble answer of Socrates, when asked how long he intended to pursue a certain study, should be a maxim for all: "So long," replied the philosopher, "as I am not ashamed to grow wiser and better." Even if the highest be not attained, a firm resolve and a laudable discontent with our present imperfections, will be a sufficient guarantee of honorable usefulness in the profession we have chosen.

But above all, let us be true to our calling as medical and surgical practitioners of a speciality; bound by all just and honorable ordinances pertaining to general practice. No one could be found willing to justify the conduct of a surgeon in general practice, who would willingly prostitute his noble and beneficent calling by sacrificing both living and priceless members for mere pecuniary gain. And yet, is there a hesitancy, a shade of doubt, why this merited condemnation should not fall upon the dental practitioner who should prove recreant to his trust? Or, if a surgeon hung out a

sign: "index fingers amputated here"—would it be suggestive of any more wholesale, indiscriminate slaughter, than the familiar ones we often see placed so conspicuously over, well—our neighbor's office door? It is in the hope that all may conform their professional conduct to the true end and purpose of a really useful professional life, of doing the highest good for our fellow men, and not for the purpose of belittleing or misrepresenting even the humblest in our profession, that these criticisms are spoken here.

There is, after all, a pleasure in *attempting* to do the right thing, even though we fail. What are lives but simply records of success or failure? While all should endeavor to attain to that high standard of intellectual and professional worth, which will confer dignity on their lives, as well as entitle them to gratitude from their fellow men, none should despair, even when he has the worst and most adverse circumstances to contend with.

> "I hold that it becomes no man to nurture up despair,
> But in the teeth of clenched antagonisms, to follow up
> The worthiest, till he die."

CARBOLIC ACID AND CREASOTE—THEIR CHEMISTRY AND THERAPEUTICAL APPLICATION TO THE PRACTICE OF DENTISTRY.

BY TRUMAN W. BROPHY, M. D., D. D. S., CHICAGO.

There are no remedies mentioned in the Materia Medica, so extensively used in dentistry, as the ones which I have selected as the subject of this paper. Therefore, I believe, we can occupy our time in no better way than to examine their merits, as well as to consider where they are indicated, and how they should be applied. Let us first look into the chemical composition of these substances and then speak of their medicinal properties. Carbolic acid has for its formula, $H_2\ C_6\ H_4\ O$. Carbolic acid is known by the names of hydrate of phenol, $C_6\ H_5\ H\ O$, phenic acid, phenic alcohol and phenol. It is only slightly soluble in water, forming *aqua acidi carbolici* of the U. S. P., but it dissolves readily in alcohol, ether and glycerine. When liquefied by heat, or by five per cent of water, it resembles creasote, and is very frequently substituted for it.

Coal-tar oil, besides furnishing carbolic acid, or hydrate of phenol, contains cresol, hydrate of cresyl, or cresylic acid C_7 H_7 H O. While wood-tar oil contains guiacol, C_7 H_8 O_2, also creasol C_8 H_{10} O_2, or the creasote with which we are all so familiar. Carbolic acid may be distinguished from creasote by the following tests: Carbolic acid boils only at 370° F., while creasote dries up at 212°. Carbolic acid is either solid, or may be rendered so by subjecting it to cold; creasote cannot be solidified by the cold produced by a mixture of hydrochloric acid and sulphate of sodium. Carbolic acid is soluble in a large volume of water (about 1 in 80 or 1 in 20, of boiling water). This solution is colored blue by a neutral solution of feric chloride, while wood creasote is less soluble in water (1 in 129) and has not a blue color imparted to it by feric chloride. An alcoholic solution of carbolic acid is colored brown by feric chloride; a similar solution of wood creasote, green. Carbolic acid forms a jelly when shaken with collodion; not so with creasote. There has been considerable discussion on the subject as to whether carbolic acid is a *true* acid. While it does not color blue litmus paper, red, thus failing to respond to the usual test for acids, we know that it unites with basylous radicals, forming carbolates, therefore it is an acid.

There is much in the literature of dentistry on the use of carbolic acid and creasote; there seems to be an almost universal preference shown for the latter. Carbolic acid has entirely superseded creasote as a remedy in general medicine and surgery, and I believe there is no sufficient reason for placing it second to creasote in dental therapeutics. Why creasote is preferred to carbolic acid by dentists, is indeed difficult to understand. A disposition on the part of members of the profession, however, to accept the methods of their predecessors, may be an explanation of the views held by so many in regard to these agents. Since carbolic acid is equal and perhaps superior to creasote, as a therapeutical agent, I shall speak of it hereafter, and shall insist that its action is identical to that of creasote when of the same strength, and their strength is determined by their power to coagulate albumen. Of twenty-five scruples of creasote purchased from as many dealers, including dealers in dental goods, I find on examination that all, with one exception, contains carbolic acid. Some indeed are pure carbolic acid—the one which is free from carbolic acid was imported and sold to me by Gold &

Blocki, of Chicago. Those, therefore, who have supposed they were using creasote have employed either carbolic acid or a mixture of this acid with creasote. Carbolic acid is soluble in water only in proportion of ninety-five per cent of carbolic acid to five per cent of water, and in any proportions stronger than that; also in the proportion of ninety-five per cent of water and five per cent of carbolic acid or any solutions weaker than that. It is impossible to dissolve carbolic acid in water alone, in any other proportions than the above. If, however, we add glycerine or alcohol to the water we may make it of any strength desired. We hear of ten per cent solutions of carbolic acid and water—this is an impossibility.

I cannot illustrate the views held by me in regard to the use of remedies more forcibly than by quoting the words of a distinguished physician, and one whom you will recognize as reliable authority on all matters pertaining to medicine. I refer to Prof. J. Adams Allen, who in his opening lecture on general therapeutics, at Rush Medical College, said: "We must trace out an essential relation between our therapeutical agents and the changes produced by disease, in order that we may intelligently apply the former to the latter. But if we cannot establish this relation, we must throw our agents aside as useless. Because Drs. A B and C have used a certain remedy in certain diseases, a certain number of times, and their patients have recovered, it is not proof that it was the result of using that particular agent. We must prove that there is a relation between the remedy we use and the disease for which we employ it. *Dis-ase* is change of structure of a part from a normal standard. A remedy is an agent which restores the part to its normal condition, no matter *h w* it does it, so it *is done*, but in the first place we must ask a question: *What's* the *matter?* What material change has taken place, and how can we restore it to its normal standard? How can we bring it back? Anything that will do that *is a remedy*, if it does not, it is *not*. If it aggravates the conditions existing, it is a *poison*, that's all."

There is sufficient in the foregoing remarks to guide us, keep us in the right path, and prevent us from misapplying remedies the properties of which are so clearly set forth in our works on therapeutics. Is carbolic acid so used, especially when applied to exposed pulps, that it will restore them to their *normal s andards?* Let

us see. In the first place it is essential to know the action of this agent when locally applied. Carbolic acid coagulates albumen, and dissolves into volatile and fixed oils. It is an escharotic, leaving a white eschar which soon turns brown and is cast off. Carbolic acid is an anæsthetic, acting with wonderful promptness upon the part to which it is applied.

Dr. J. H. Bill states in an article published in the "American Journal of Medical science," that "by applying carbolic acid to the integument, insensibility to pain may be sufficiently induced to permit free incisions without suffering." The escharotic action of carbolic acid contraindicates its use as an application to exposed pulps, the vitality of which we endeavor to preserve. If, however, we make a solution of from one to five per cent, we have an excellent remedy, slightly stimulating and antiseptic, which may be applied to an exposed pulp without fear of causing a slough and subsequent death of the whole part. I desire, gentlemen, to repeat what I stated to you three years ago, to wit: That I regard it bad practice to apply an escharotic to a pulp, the vitality of which may be preserved by proper treatment. Carbolic acid or creasote, therefore, if used in contact with exposed pulps, which we subsequently cap, must not be stronger than a five per cent solution. Carbolic acid has been very successfully used to arrest nausea and vomiting. From one to two drops in a glass of water will usually accomplish the result desired.

Since carbolic acid has the power to arrest suppuration, and to promote healthy granulations, it is invaluable in the treatment of alveolar abscesses, apthæ, ulitis, stomatitis, phagedæna, papilloma, epithelioma, schirrous, cauliflower growths, etc. In the treatment of the above diseases, the agent should be of such strength as the requirements of the case indicate.

Carbolic acid *is a powerful* antiseptic, but *is not*, as many well-informed members of the profession believe, a disinfectant. Carbolic acid *has* the power of preventing decomposition (hence *it is* an antiseptic), but *has not* the power to destroy or render inoffensive the products of decomposition; therefore it *is not* a disinfectant.

Owing to the erroneous impression as to the properties of carbolic acid, it is used to the detriment of patient and practitioner in

the treatment of many lesions. Carbolic acid is an irritant poison. Although an escharotic it diffuses into the blood rapidly. If carbonic acid has been taken in toxic doses, liquor calcis. saccharotus or oil is the antidote. When it is found necessary to devitalize a pulp, the anæsthetizing properties of undiluted carbolic acid make it desirable as a dressing previous to the application of arsenious acid. There are other remedies, however, equally as efficient. Carbolic acid is the most satisfactory agent to obtund sensitive dentine without endangering the vitality of the pulp, with which I am acquainted. Carbolic acid may very properly be applied to the canals of teeth immediately after extirpating their pulps, but if the pulp is putrescent it is not to be used; since some form of chlorine is the agent indicated with which to disinfect the parts.

Carbolic acid as well as creasote, are flesh preservers; indeed, the word creasote is derived from two Greek words, *Creas*, flesh, and *Sotal*, I preserve—flesh preserver. It preserves flesh, however, not as is frequently supposed, to wit: by preventing vital soft parts from losing their vitality, but by preventing non-vital tissue from becoming putrid and disintegrating. Carbolic acid is a most excellent remedy to apply to carious teeth during the process of excavating, to enable us to more clearly see the extent of the caries. In many cases where we have adjusted the rubber cloth and excavated the cavity in the most skillful manner, we are surprised, upon moistening the cavity and its surrounding surfaces with carbolic acid, to find carious tissue, which if permitted to remain, would soon render another operation necessary, in order to arrest the progress of disease. If a few drops of carbolic acid be added to sandarac varnish, which we use for moistening cotton to be used for temporarily sealing cavities, it will prevent decomposition of the secretions which accumulate about the cavity and the cotton will remain free from offensive odors much longer than it otherwise would. Carbolic acid is most destructive to the lower forms of life. These minute organisms so frequently found in the oral cavity and in carious teeth cease to exist when very dilute solutions of this agent are brought into contact with them! "As all fermentations are co-relative of the growth and multiplication of these minute bodies, carbolic acid, by destroying their activity, arrests zymosis." A solution, one per cent in strength, according to Dr. Isador Neumann, is sufficient to

destroy bacteria, vibrio, etc. Much more might be said in regard to the use of carbolic acid in dentistry, but I shall detain you no longer. I hope there may be untiring research without prejudice, by the members of our profession, as to the action of remedies, so that we may soon say that empiricism has yielded to the higher, more reliable and satisfactory methods, based upon the grand, broad, beautiful and universal truths revealed to us through the instrumentality of science.

After reading his paper Dr. Brophy exhibited the collodion test for distinguishing carbolic acid from creasote.

DISCUSSION.

DR. CUSHING: I have procured an article of colorless creasote from Sargent, imported by him which he believes to be pure.

DR. K. B. DAVIS: I have found carbolic acid to be much more escharotic than creasote.

DR. BROPHY: I agree to that, but claim that creasote has no properties not possessed by carbolic acid of the same strength.

DR. SPALDING: What is the standard of strength since creasote and a 95 per cent solution of carbolic acid are not of equal strength. The experiment by coagulating collodion is merely for identifying them, and is not a test of relative strength.

DR. KULP: What are the comparative merits of the two for the treatment of abscess as shown by experience? That may perhaps throw as much light upon the question of their relative strength as a theoretical examination.

DR. HARLAN: I wish to correct one error in the paper. Carbolic acid in full strength is not an anæsthetic. That property is only developed by dilution and evaporation. Pure wood creasote reddens litmus paper and does not coagulate albumen to anything like the same extent as carbolic acid, and is much inferior to carbolic acid for use in practice.

DR. BROPHY: A 95 per cent solution of carbolic acid *is* anæsthetic.

DR. HURTT. I have often verified the statement of the paper as to the anæsthetic properties of carbolic acid by using it for that purpose in making incisions into abscesses.

DR. TALBOT: The same thing is shown in the old method of

capping exposed pulps by bathing them with carbolic acid or creasote and covering with oxychloride of zinc. The severe pain which the contact of the chloride of zinc would otherwise cause, being prevented by the anæsthetic effect of the carbolic acid.

DR. CROUSE: The chloride of zinc does not come in actual contact with the pulp on account of the coagulum or eschar between, which has been made by the carbolic acid, and I think that accounts for the absence of pain rather than any anæsthetic effect of the carbolic acid.

DR. TALBOT: The chloride of zinc would penetrate the coagulum and still produce pain except for the anæsthetic effect of the carbolic acid.

DR. BLACK: I do not believe that chloride of zinc will penetrate a coagulum, but in many cases an application of creasote or carbolic acid does not reach actual contact with the pulp. If it can be made to do so, and forms a *complete* eschar over the entire exposed surface of the pulp, there will then be no pain from the chloride of zinc, but that is often a *very* difficult thing to do.

DR. HURTT: There are many young men in the state who have been led into difficulty by the statements made in the society, in former years, about capping pulps with oxychloride of zinc without pain—*without* the warning that Dr. Black has just given of the difficulty there is in making the preliminary application of carbolic acid complete and effectual. In one instance myself, I filled a cavity in which there was an exposed pulp (in grinding surface cavity in lower molar), full to the brim with carbolic acid and left it there for fifteen minutes, and then capped it with oxychloride of zinc without wiping away quite all of the carbolic acid; but after ten or fifteen minutes there was excruciating pain, which required two hours to relieve, after having removed the oxychloride of zinc, and which the patient remembers with ill feeling toward *me* to this day.

DR. HARLAN: When the pain in an exposed and inflamed pulp is relieved by an application of creasote or carbolic acid, it is not the anæsthetic effect of the application that stops the pain, but it is the exclusion of the air and other irritants from contact with the pulp by the eschar which the application produces, and anything that can get through the eschar may produce pain.

DR. BROPHY: Will *any* escharotic have the same effect in quieting the pain?

DR. HARLAN: Some escharotics will not act in that way, but will increase the pain and irritation.

DR. BROPHY: I insist upon it, that it *is* the anæsthetic effect of the carbolic acid application which relieves the pain in these cases.

DR. TAYLOR: How long will the anæsthetic effect of the application last? I believe that the carbolic acid has some effect upon the circulation which prolongs the relief from pain.

DR. BLACK: What has been said about the difficulty of obtaining a *complete* eschar would lead any one to be careful and not be surprised if there were pain in some cases.

DR. HURTT: Pain will ordinarily be prevented if the slab on which the oxychloride is mixed be warmed, and the material mixed as thick as it can be handled without using pressure upon the pulp.

Dr. Harrison asked Dr. Black the difference between carbolic acid and creasote for the treatment of abscesses.

DR. BLACK: I think them alike—if I have ever had any creasote that was free enough from mixture with carbolic acid, to afford me any fair comparison.

Dr. Brophy called attention to the statement that an escharotic should never be applied in direct contact to an exposed pulp.

DR. BLACK: I made the same assertion at the previous meeting of this society at Bloomington (ten years ago), and I still believe so. In a paper at that time I gave a record of ten years of indiscriminate capping (with oxychloride of zinc), and followed by general failures (as was characteristic of the general practice of that time), but I believe then and now that capping with oxychloride of zinc is good practice in *select* cases.

Dr. Sturgis thanked Dr. Brophy for his efforts and investigations in regard to this subject.

FILLING TEETH—SOME SPECIAL POINTS TO BE OBSERVED.

BY E. NOYES, D. D. S., CHICAGO.

There are many other things comprehended in the science and art of dentistry, as practiced nowadays, besides filling teeth, and such things as chemistry, anatomy and physiology, pathology,

therapeutics, and the knowledge and management of all the special diseases that require consideration or treatment by the dentist, are so comprehensive in their scope, so various and intricate in their details and so difficult of thorough mastery, that a very large proportion of the *student's* time must necessarily be given to *them*. He may receive the impression that in actual practice he is to find these various subjects claiming his attention in much the same relative proportions. He will probably find, in *fact*, that three-fourths, and perhaps, nine-tenths, of his time devoted to patients having natural teeth, will be occupied with the operations of filling; while some other acquirements, which perhaps consumed much more of his time and effort while a student, are called into direct exercise but seldom. It is not a proper inference from this that a student should be required to spend most of his time in practicing the operations of filling. He only needs to spend enough time, and under competent instruction and supervision, to acquire correct *habits* of manipulation and a good understanding of the mechanical and artistic principles involved; then if he have such a degree of manipulative aptitude and ingenuity, and of artistic perception as every dentist ought to be endowed with by nature, he will soon become expert in these operations that he must be performing all the time, while the things that he is called upon to do but very seldom must be thoroughly mastered and practiced while a student, if they are ever to be.

The operations of filling teeth are mechanical and the principles and relations *directly* involved are mechanical and artistic ones. They *may* be performed with little or no reference to any others, as though working upon a dead body instead of a living person. The man who does so may be a fine, and even artistic *mechanic*, but has little claim to be called a *professional* man.

The principles and relations *indirectly* involved in consequence of the vitality of the organs to be operated upon, and the mutual relations and dependences between them and the living body in health and disease are recognized and understood so as to guide or modify, or control the operations, in proportion as a man's education and ability enable him to rise above the level of the mechanic to that of the professional man.

So large a proportion of time being spent in the various operations connected with filling teeth, it follows, of course, that success

and usefulness *very largely* depend upon the ability and disposition to make thoroughly good fillings. Dentists are entirely isolated from each other during working hours, and have few and scanty opportunities to observe each other's methods, or even to talk together about them, and though there is a great variety and a wide range of differences, in the different operations, and the different patients, so that we may say that no two operations are *exactly* alike, yet *practically* we have, after a time, a continual repetition of things we have done before. This makes it inevitable that we shall acquire, after awhile, some very firmly fixed *habits* of operating, and get to running in some pretty deep *ruts*. There may be no great objection to this if the *habits* are only good ones and the *ruts* are smooth and free, so as to facilitate easy traveling, but no man has the best methods of doing *all* things, and we cannot be too earnest in endeavors to observe and compare the methods of other men with our own, for the purpose of finding out whether some of them *may* not be so much better than ours as to justify the trouble of unlearning old methods and acquiring new ones. Most of us are workers and not talkers, and ought to make the special effort necessary to be able to describe an operation minutely and accurately, so that those listening will be able to have in their imaginations an image or picture similar to the one in the mind of the narrator, and not, as is so often the case, a very different one. If it were possible, it would prove of the greatest benefit for each of us to become familiar with the habits and methods of a dozen or twenty of the best operators we could find, as a student does with his preceptor. The clinics and discussions at society meetings should be made to do all that is possible toward that end.

In filling teeth all points are *special*—that is to say, each step in every operation requires the best attention and most perfect performance that we are able to give it, and some things not mentioned in this paper may be of as much importance as anything in it. When a mouth is presented for filling teeth, it is often desirable, and in some cases indispensable, to clean the teeth before anything else is attempted, and I feel moved to speak just here in emphatic condemnation of the inexcusable negligence of very many dentists in regard to the removal of tartar. It is a burning shame and almost a criminal neglect for any man to dismiss a patient with the

implication that nothing more needs to be done, until he has thoroughly removed every particle of tartar that can be removed (unless the teeth were free from it before). The disagreeableness, difficulty and small compensation attending this operation are not sufficient excuses for the common neglect to perform it, and very often the service that can be rendered in this way, accompanied by specific instructions in regard to future management in respect to cleanliness, *may* prove of greater service to our patients than all the fillings we may make for them. I have seen the condition and appearance of some mouths totally changed—revolutionized, as a consequence of such treatment and instructions.

The next important step, preliminary to operations of filling, is to make a very careful examination of the mouth, going through it with floss-silk, mouth-glass and small excavators or exploring instruments, tooth by tooth, till the condition of each one is ascertained as nearly as possible with reference to decay, and a permanent record made in a book to be kept for the purpose. Similar signs can be used as in the recording of operations. Doubtful places should be indicated and afterward separated one by one with rubber or otherwise for perfect examination and operation if found necessary. A comparison of such an examination with the record book will at any time show what has been done and what remains to do.

The advantages of such an examination are very many. The most important, perhaps, is the opportunity it gives to plan the entire series of operations and arrange the various items so as to be consistent with each other as well as suitable in each instance. The saving of time in frequent re-examinations and security from the liability to overlook or forget important operations, are of great consequence also. It is a very poor service that a man renders his patients if he only fills cavities that are pointed out to him without taking much care or responsibility for the entire mouth, and almost all our patients ought to receive just such thorough and comprehensive care and treatment, whether they come in the first place with any such desire and expectation or not. Most of them will be glad to allow it if properly advised and treated with frankness and sincerity.

The sequence of operations can often be more conveniently arranged if the whole series are presented to the eye at once upon

a suitable diagram. It also gives the best opportunity that can be had for estimating the probable cost in the cases when it is necessary or desirable to do so. There are very many people who are unwilling to begin a series of dental operations, as they are obliged to a severe illness, without the remotest idea whether the expense will be nearest to $25 or $50, and there is not often *very* serious objection to giving patients about as much information as we can obtain beforehand ourselves. It will seldom be definite enough to be of much use for "shopping," and of course there is little motive to give prices to those who want them only for comparison wth those of other dentists, but those whose circumstances make it really desirable that they should know something about what they will have to pay can usually be told within, say, 25 per cent, the margin varying greatly in different cases. It is not well to do too much *guessing*, else we shall get *left* ourselves with too small a price, or our patient will leave for fear of one too large.

Having made the examination and formed the general plan of operations, the next step is to obtain the proper opportunity to work.

This, in respect to grinding surface cavities and buccal cavities consists in little else than the adjustment and retention of the rubber-dam. Patients usually regard the clamp as a barbarous instrument, and its use ought probably to be confined to buccal cavities in the back part of the mouth, and in lower teeth. In these it keeps the rubber from falling against the cavity, giving room to work and does not strain the corner of the mouth so much as an instrument with a handle held against the tooth by an assistant. In all the teeth forward of the molars the crescent-shaped instrument held against one side of the tooth is far preferable to the clamp for exposing cavities at the margin of the gum. In all grinding surface cases when necessary, and in proximal ones, when the rubber is liable to slip off from one or both of the two teeth to be covered, the most useful auxiliary that I know is a string of waxed floss with two beads tied upon it. This is quickly and easily tied around almost any tooth (of course *before* the rubber is attempted to be put on), and its application is seldom more than slightly painful, if at all. It can usually be done even for very small children, and the rubber once slipped over them is in no danger of coming off. In some cases where

the adjoining teeth are very close, and they are not needed for *retention*, time can be saved in adjustment by tying on the beads, by stretching the rubber down over them on each side, the edges of the hole are held in proper position for readily drawing down between the teeth with the waxed floss. If your assistant is used to it and the mouth is large enough for two pairs of hands to work in, it can be done quicker by one holding the rubber while the other forces it in between the teeth. These appliances, and the orange wood or hickory wedge, for crowding back and retention above the margins of approximal cavities are about all that I have ever found necessary for retaining the rubber dam in any place where I desire to use it. Many small grinding surface cavities in second upper molars and wisdom teeth can be entirely filled in less time than would be required to adjust a rubber dam over them. If a good sized piece of spunk is placed upon the duct of steno, and a napkin laid on a piece of rubber carried into the cheek around behind the last tooth, the finger that holds it in place resting usually on the spunk that covers the duct, the rubber lining will keep the napkin from becoming much wet for a good while. If such cavities are large enough to require a lining of oxychloride of zinc, the rubber should be adjusted upon them in the usual way at almost any expense of time and trouble, *especially if the filling is to be amalgam.* I believe that material is more damaged by a little water than any other with which I am acquainted, and the water is less certain to provide its own remedy by stopping the progress of the operation.

Obtaining the proper opportunity to work in the case of most approxinal cavities consists first in the previous separation of the teeth by means of wood, or rubber, or cotton wedges, and afterward in driving a firm wedge of orange wood or hickory between the teeth close to the gum after the rubber is in place. Those who have not tried it often will be surprised to find how very few cases there are in which it cannot be forced high (or low) enough to expose the margins of cavities extending far under the gum. It will often have to be made then and bent up (or down) like a bow and carried very near or quite to the process. Patients are very apt, and probably justly, to call these wedges barbarous as well as the clamps, but their great and indispensable usefulness and the lack of any substistute for them, have kept me thus far in the constant use of them.

The *previous* separation I regard as of *very* great usefulness and importance in most cases, and I see very many teeth which in my judgment have been injured by the cutting, which the want of it made necessary—many front teeth that have been inexcusably mutilated, unnecessarily injuring their appearance beyond remedy. Teeth that have space between them at the necks and touch near the grinding surfaces in a full or crowded arch, so that if cut they will come together and touch again, are often made more certain to decay the second time than the first, by such treatment, the surfaces in contact being less convex and the necks nearer together than before. These considerations are of most importance of course in the cases which do not require cutting from the grinding surface, but they have nearly equal weight when they come to the grinding surface by a small notch, and do not involve a *very* large proportion of the approximal surface. This previous separation is a great deal of trouble both to the dentist and his patients, and it is only reluctantly and by experience and observation of its great value, that any one is likely to form the habit of doing it in all the cases in which it is desirable.

I believe myself that it is well to fill a great many small cavities with soft foil, wholly or in part, and to use a great deal of foil without annealing in all cavities which do not require that the finished plug should be a perfectly coherent mass. When cohesive foil is added to soft foil, care should be taken to drive the first portions into the soft foil like a wedge, and not plaster them over the surface, as would be done if the previous mass were cohesive.

A special point about finishing fillings, and one often neglected, is to cut away *enough* of the gold, so that there will be no thin portions left overlapping the margins (this applies to both approximal and grinding surface fillings), and it sometimes requires very close scrutiny to determine just when all the overlapping gold is removed, and it cannot be properly done at all unless the border of the cavity has been well prepared in the first place. Then, of course, the work should be left smooth and well polished, if an approximal filling; in grinding surface, if smooth and not overlapping the margins, a *polish* is of little consequence.

Contour fillings, especially corners and sides of front teeth, need very careful attention as to their shape, and the exercise of good taste

and a good eye for form. A great many such fillings are greatly exaggerated in size and others are too full in some parts and not full enough in others. I have seen many that were fuller than the original form of the tooth, seeming to say to the eye, "This work is a *little* better than Nature's was. I will therefore show a little more of it and make it generally more conspicuous." Good taste requires that such operations should please the eye by a close reproduction of the original form, a little less than the original in bulk, being of conspicuous color, and at best but an artificial substitute for nature, which should thrust itself upon the attention as little as possible.

Another special point is a retaining point, and which I believe is, in many cases, made too deep and too near the margin, especially if at the cervical wall. The only use of a retaining point deep enough to set a screw in is to have a screw set into it. The principal office of a retaining point or a groove is to hold in place the first pieces of gold packed into it. If they will do that they are usually sufficient for all necessary purposes as dovetails to retain the finished filling. At the necks of the teeth they must often be made with a very small drill, often much smaller than White's No. 1, and the grooves with a *very narrow* chisel and it is seldom necessary to cut them deeper than their diameter.

Large cavities, more especially approximal ones in bicuspids and molars, are sometimes left with too deep natural undercuts, and the overhang too frail. Do not be afraid to get a saucer shaped cavity that looks as if a filling would not stay in it, as a consequence of cutting away all the weak overhanging portions of enamel that are reasonably sure to break down and split off after awhile if left there. The buccal and palatal walls are specially liable to fail if left too thin and weak. On the other hand, the arch of enamel from the buccal to the palatal walls at the approximal border of the grinding surface, should be sacrificed with reluctance, especially if the cusps are long and the sulci between them deep. It should be retained if there is any probability that it will stand. Undercuts and retaining points, to be of much value or permanence, should be made wholly in dentine and not in enamel.

I think I must have a little to say about amalgam, a material that has been much abused; perhaps the worst abused by some of those who use the most of it. It is my opinion that the proper use of amal-

gam calls for a higher degree of fidelity and carefulness, and an equal degree of skill and manipulative ability as any material now in use for fillings, but it is very easy to make them so that they will appear well at the time, and yet be so very imperfect as to be in the end of very little use for the preservation of the teeth. There are some kinds of amalgam in common use with which I believe it a physical impossibility to make a good filling, and there are many with the working qualities of which I am not acquainted. The same one should be used until perfectly familiar with its peculiarities, so as to be master of its working qualities, for they will not all admit of the same style of manipulation. The cavities must be very carefully prepared, and in almost every instance the rubber-dam *must* be used, for there must be no *chance* of getting moist, unless in the forlorn cases where a *good* operation is out of the question. The materials should be quickly and thoroughly mixed in just the right proportions, and will be so dry and powdery as to be a nuisance to get where it is wanted in many cases. It must be *packed* in small quantities and with points that will condense it well into corners and undercuts (a small ball burnisher is best in places where it will go). It sets so fast that two mixings will often be necessary in places where it is difficult to carry it to its place and the filling is large. It must be packed and worked together solidly throughout, with much the same force as is used for condensing by hand the surface of a soft foil filling. If dry, as it should be, it is very difficult to build up a corner with it, and in most compound fillings a matrix should be used. One is easily made by bending slightly, if necessary, a piece of separating file and pushing in a soft wedge behind it, or a piece of sheet lead may be bent around one side of the tooth across the cavity and held by ligatures. Twice the time will be saved that it takes to adjust them and better work can be done and a more satisfactory contour obtained. They can be immediately removed and the filling trimmed to very nearly its final form. It is indispensably necessary that every amalgam filling should be polished at a sitting subsequent to its insertion.

It is impossible to deny that amalgam fillings *can* be made in the way I have indicated so as to be thoroughly good operations, in the same sense and for the same reasons that well made gold fillings are good operations. The characteristics that make them so may be

described in the same terms, that is, they will not leak; they will take and retain a smooth surface; they will make a smooth margin that will not crumble. The difficulty of doing good work with amalgam often increases with the smallness of the cavities if approximal ones, and I believe that most approximal cavities not reaching the grinding surface, if of sufficient depth and having good walls, are better filled with tin foil than amalgam. If Williams' tin cylinders are used, of style B, which are rolled pretty hard, a little practice will enable one to make them in many cases as quickly and easily as with amalgam, and with the advantage of finishing at once. There are many places, especially in young or soft teeth, in which I question whether gold will make as useful a filling as tin. The range of application for tin is quite limited, but within its proper limits I believe it one of the most useful materials we have. The great convenience of these tin cylinders, and the fact that they appear to be but little known or used, are perhaps sufficient reasons for directing your attention to them particularly. The tightly rolled ones, style 1 B, and 2 B, can be used in about the same way as folded pellets of foil, and by spliting them lengthwise with the scissors as small pieces as are desired can be easily obtained. Tin is practically non-cohesive, and one who never makes a gold filling without lighting his annealing lamp, will be likely to need a little practice before acquiring facility in its use. Every piece, even to the very last, must go deeply enough into the cavity to be retained by wedging, but it is considerably softer and more easily wedged tight than gold; the surface condensation will take effect more deeply, and it is far more rapidly and easily trimmed and finished.

I am not one of those who desire to see the use of amalgam increased, but I wish that men should feel as much under obligation to maintain a high standard in their operations with it as they do in their gold operations, and to keep them as carefully under the supervision of their consciences and their professional pride. If that is accomplished, amalgam fillings will be found less renumerative than gold ones, and so the motives of self-interest will be on the side of the better material. I believe that such treatment of the "amalgam question" will do more toward restraining and diminishing its improper use than the wholesale and unreasonable denunciation that we sometimes hear.

DISCUSSION.

DR. STURGISS: I heartily endorse the paper. It is full of practical suggestions. Probably it is right to insist upon a great deal more care in making amalgam fillings. I have *tried* to remember that I *ought* to take as much pains in preparing the cavity, and in making and finishing a dollar amalgam filling as I would an eight or ten dollar gold one, but it keeps me pretty busy *remembering* for so unwelcome a duty slips out of mind.

DR. K. B. DAVIS: One or two points might be more fully developed. A great many failures are caused by want of proper preparation of cervical margins and improper malleting there. There is difficulty in finding proper instruments to cut them with. I use at the cervical margin a large pellet of soft foil, held in place till small pieces of cohesive foil can be driven into it so as to confine it perfectly. It is often difficult, though very important, to finish fillings perfectly at the cervical margin, especially in bicuspids and molars. Amalgam fillings should never have any attenuated edges, for the material is far less tough than gold and thin edges are likely to break away and leave a ragged margin.

DR. CUSHING: I wish to emphasize what Dr. Davis has said about the preparation of cervical walls of cavities and over malleting there. Too great care cannot be used in that respect, and it is a very difficult matter to be thorough there. It is often almost impossible to get a good view of them and many dentists do not cut away enough to get *perfectly* sound and strong walls, or to make the filling cover the surface most liable to decay. I was shown a tooth some time ago (which had been extracted) having a filling hanging out of the cavity at the cervical margin a full line. This tooth and its next neighbor had proximal fillings which filled up all the space between the necks of the two teeth instead of being trimmed to the proper contour. Of course the gums were constantly irritated and of course they decayed above the fillings.

Dr. Matteson asked the essayist in what places he would make tin fillings. Dr. Noyes replied: In six-year molars for young children, and in many approximal cavities in molars and bicuspids not involving the grinding surfaces, especially in cases where amalgam would be the alternative.

Dr. Krape asked what he would use in frail front teeth. Dr. Noyes said: If not gold, then Hill's stopping, oxychloride of zinc, or phosphate of zinc, but never amalgam in any instance.

DR. CROUSE: I always like to find some points in which I can differ from an essayist. I would not allow the use of an orange-wood wedge for crowding back the gum in my own mouth, and will not subject my patients to that infliction. It is much too severe, and the object can be gained in other ways.

I cannot make an examination so as to be reliable in one sitting, nor estimate the price of a series of operations with anywhere near so close approximation as is needed to make a bargain. It is better to give a large part of a bill, if necessary, than to estimate the cost before hand.

The beads for holding down the rubber-dam are a very pretty way *for the operator*, but not for the patient. I have not tied a string around a tooth in a year. It is often very painful to apply, and frequently irritates the periosteum so much as to make the tooth sore under the mallet, before the operation is finished. For holding the rubber-dam, I clean the surface of the tooth from mucus by rubbing it with pumice stone, and then after applying the dam and drying thoroughly, apply to the tooth a piece of spunk, having a drop of thick sandarac varnish upon it. It will quickly dry enough to stick, and will adhere to the tooth with great tenacity. Have only a little varnish and apply neatly so that the spunk may stick to the tooth only, and not to the rubber. This plan is so valuable that any one practicing it enough to acquire facility will use few other methods for retaining rubber-dam in place.

I will only emphasize what was said in the paper about separating teeth before hand for room to operate. I don't like any guess work, and want free access and opportunity to see in every place where I have to work if it can possibly be got.

I use tin foil instead of the prepared cylinders and pack it with sharply and deeply serrated points, so as to interlock the different pieces as much as possible. I often use it at the cervical margins of gold fillings. The only serious objections to it there is, that if the teeth happen to be examined by some other dentist the dark color and softness of the tin—perhaps mostly concealed by the gums—may lead to the supposition that the fillings are leaking there. I often

pack tin foil in the fissures of six and twelve year molars almost as soon as they are in sight above the gum, and before decay has begun, without excavating them, and sometimes without attempting to keep them dry. It will prevent or retard decay until the teeth are matured sufficiently to admit of making proper fillings in them.

DR. TOWNSEND: I wish to endorse emphatically what Dr. Crouse said about holding the rubber-dam with spunk and sandarac varnish. I practice that method constantly with the greatest satisfaction. In buccal cavities under the gum, room can often be got by filling the cavity overfull with gutta percha until the gum is absorbed or crowded out of the way.

DR. MCKELLOPS, of St. Louis: I like what Dr. Crouse has said about separating teeth for opportunity to work. I never believed in working where I cannot see. I always prepare a mouth, cleaning it of tartar, treating the gums, removing diseased roots, etc., as may be necessary, before beginning to fill teeth. It is impossible to make a thorough examination without frequent use of the rubber-dam. I use pieces of spunk tied on a string instead of beads. It is softer and hurts the gums and periosteum less. Operations will hurt, but good operations can be made being gentle as being rough. In filling buccal cavities, I hold back the rubber with an instrument having a sharp edge, held against the tooth beyond the margin of the cavity, and use cylinders of Abbey's soft foil next to the cervical wall. In exposed fillings in front teeth I use a platinum foil (a layer of platinum between two layers of gold, beaten together). It is is less conspicuous in color than pure gold.

I am in the habit of teaching every patient how to use a tooth-brush so as to cleanse the mouth thoroughly. Some men say that they have not *time* to attend to such matters as that, but a good man *must take* all the time necessary to do first-class work. If we are not good operators it is our own fault. We do not attend society meetings often enough; we do not attend clinics carefully enough; do not read our literature thoroughly enough, and are not willing to pay the price for the new books that are brought out.

I never use tin. I never made an amalgam plug in my life. I am opposed to it totally. I think the mercury in it devitalizes many teeth.

[Continued in September number.]

MECHANICAL DENTISTRY—ITS PROGRESS AND ITS CLAIMS.

BY DR. J. A. OSMUN, OF NEWARK, N. J.

[Abstract of a Paper read before the New Jersey State Dental Society, July 22, 1880, and reported for the MISSOURI DENTAL JOURNAL.]

We find in practice that by common consent our profession is divided into two branches, that of operative dentistry consisting of the pathological care of the mouth, while mechanical dentistry is supposed to consist merely of the replacement of the lost organs of mastication. Of the two branches it seems that operative dentistry engages by far the more attention, on the principle, probably, of that very worthy maxim that an ounce of prevention is worth a pound of cure. Yet often in our earnest endeavors to promote one truth, we lose sight of others of equal importance.

Viewing respectively the achievements in mechanical dentistry from the time of the fathers of the profession down to the present, it is very gratifying to note how much has been accomplished, what great progress has been made toward perfecting artificial dentures, and we have a feeling of pride and gratitude that we are able to replace the natural organs, when they have been lost, so satisfactorily and perfectly, comparatively speaking, as we now do. How crude were the early methods of restoring lost teeth, and how repulsive in some repects, as in the use of other human teeth and the teeth of animals! Compared with these rude efforts the beautiful mineral teeth that we now have in such variety of shapes and neatness of setting are triumphs of art. Note also the long list of materials that have been tried to obtain the ideal plate, from those cut and carved from wood and ivory through the entire history of swaged plates to the vegetable compounds of these later days. Gold, which for a time held place at the head of the list of materials as the base which would meet all the requirements; silver, which had only cheapness for its recommendation; aluminum, and the cheoplastic bases, which soon disappeared. Continuous gum, for beauty, cleanliness and symmetry has no equal, but it has objections which preclude its universal adoption.

The vegetable compounds introduced within the last few years have brought about some radical changes in the domain of prosthetic dentistry, and it is a question with some whether it would not have been better had they never been introduced on account of the injury caused by their use and abuse by incompetent dentists.

Within the last few months an alloy base has been presented to the profession which seems to combine more merits than any of the others in use. Time will prove the value of its claims.

But notwithstanding these triumphs in mechanical dentistry, at no previous time has there been so much injury inflicted and suffering caused as at the present by improperly constructed dentures and those made of inferior materials.

That mechanical dentistry, intelligently practiced, is productive of as much comfort and contributes as much to the prolongation of life as operative dentistry does, will admit of no argument. But for some time past it seems to have fallen into disrepute, and in fact it is held by many that the two branches should be separated; that the dental surgeon should confine his attention entirely to the pathological condition of the oral cavity, while the branch of mere mechanics should be delegated to the artisan. This division into separate specialties is open to objection. It is necessary that the operator should know all branches in order to be able to restore the mouth to its original shape and expression, and he must have daily observation of dentures as they are presented from time to time in the operating chair. Without this general knowledge and experience one is not a dentist in the true si_nification of the word, but a "fractional dentist," to quote Dr. Marvin. It requires all the skill of the most consummate artist to properly fashion an artificial denture so as to make it subserve the requirements of mastication and speech, and at the same time restore the natural expression of the mouth. All parts of the face have their fixed relations to each other and to the character of the person, but the mouth more than any other feature reveals the nature of the individual. The tongue may be silent, but the mouth never ceases to impress one either favorably or unfavorably. Therefore how important it is that we who have the making of signs of character in this feature should give the subject the closest attention. One too often sees the evidences of neglect, and ignorance of the relations of the mouth to the

temperament of the individual in the color, size and arrangement of artificial teeth.

Mechanical dentistry, as a small atom of science, needs a broad intelligence in its practitioners and a careful estimate of all the forces which may tend to enlarge our knowledge of this important adjunct in the relief of human suffering. Thoroughness of education should be impressed upon the mind of the dentist, a knowledge not only of the narrow mechanical details, but of all collateral sciences that will contribute to his success.

And if our patients would exercise the same diligence in the care of their teeth after the dentist's skill has placed them in order, would honestly follow his directions as to cleanliness, etc., we would have small occasion to call attention to the condition of mechanical dentistry, and urge upon the profession its more thoughtful consideration. But it will be many years before the great mass of the people will so live that perfect dentures will be the rule, notwithstanding the wonderful advances made in the direction of preventing and removing caries of the teeth. Therefore the neglect of the mechanical branch in our profession, in anticipation of this millennium, is worse than folly. This branch claims from the members of the profession the same care and study as its counterpart, operative dentistry; there should be no conflict between them, but a harmonious unity, one supplementing the other.

DISCUSSION.

DR. ATKINSON, of New York: I am pleased to hear the paper that has been read by your essayist, and I endorse nearly every sentiment that he expressed and the views that he urged. It is true that it is better to have natural organs in good working condition than any substitute whatever, and it has been the ambition of my life to do what I could in the direction of preserving the natural organs. But however earnest any man may be, it is impossible to so impress the great mass of the human family with the importance of these organs as to have them preserve them against the iconoclasm and wickedness that prevails in high places, of extracting the natural organs when but slightly diseased. I have been brought to suffer more mental pain from seeing these offenses against nature and their deplorable results, than from all other experiences of my

life. See with what recklessness the teeth of the human family are removed, especially since that lieutenant of his satanic majesty, anæsthesia, made its appearance on earth.

There is one matter mentioned in the paper that I wish were better understood; I refer to the new base of Dr. Reese. I have had a good deal to do with it in the way of investigating it and testing its value, and in my opinion the only difficulty in the way of its being the very best thing that has ever been introduced for the support of artificial teeth, is the want of intelligence and faithfulness on the part of those who should know how to manipulate. Any man who is fit to be a mechanical dentist at all, will do better with that than with anything else. But the great obstacle is the slovenly manner of doing work that the people have forced dentists to adopt for the sake of cheapness.

The great objection to the vegetable compounds lies entirely behind manipulation; it is inherent in the bases themselves. They are not adapted to a healthful condition of the tissues because their conductivity is so far different from the conductivity of the tissues themselves. One cannot wear artificial teeth set upon any of those vegetable bases that are so low in conductivity of the thermal and electrical currents and have a healthy mouth, if they are worn continuously. I have seen, in my experience in the last year or two, cases in which black rubber was used as the base, where the entire portion of the mucous surface covered by the black rubber was discharging pus. I have never seen either celluloid or rubber worn continuously in the mouth that it did not change the secretion of mucus to some abnormal presentment. And yet the advice of all the "Cheap Johns" is: "You need not expect to wear your teeth with any comfort unless you wear them continuously—you must wear them all night." All the tissues need respiration, just as much as our bodies—just as much as our lungs, and if you do not give breath to the elements of the tissues, you cannot have health in the mouth. At every step from the conversion of food into blood and the blood into tissue, all the way through, the molecules that enter into the tissues, must have elbow-room in order to effect the molecular changes, and that is what I call the breathing of the tissues themselves.

I have worn for over a year two pieces made of this new combi-

nation base, and I never have worn any artificial teeth with as much comfort as I have these, and I suspect that what makes them so comfortable is the fact that the conductivity of the base is nearer to the conductivity of the tissues than is the case with the vegetable bases.

The cases that I mentioned as discharging pus from the mucous follicles of the mouth, the teeth being set on a rubber base, were all partial pieces, and after inserting a Reese metalic base, plated with gold, I had the satisfaction to see in every case a complete restoration to health. I do not attribute that altogether to the high conductivity of gold, but also to the fact that I require my patients to leave their pieces out at night so as to give the gums, that had been deprived of their natural elements, sufficient time to respire. It is really quite as much of a feat to restore artificial teeth as substitutes for the natural teeth, as it is to restore portions of the natural teeth by filling.

DR. W. T. SHANNON, of Brooklyn: I am very glad to see that the nestor of our profession, in the later years of his life, is approaching the confines of conversion. The time was when we would not be apt to hear from our worthy brother anything that would savor at all of the removal of the natural teeth and the substitution of artificial ones. I am glad to find that his experience, both personally, with the dentures in his own mouth, and observation of his patients, will now authorize him to advocate, justify or excuse the introduction of artificial dentures.

And I was gratified also to hear the paper read, setting forth the necessity, advantage and comfort of proper artificial dentistry. The fact is that in the last few months I have had in my hands patients who have gone through the tortures of the damned in operative surgery; delicate, sensitive persons, whose teeth were so sore, and whose systems were so susceptible to the slightest disturbance of their nervous organization, that on leaving my office, they have been obliged to keep their beds many hours before recovering from the nervous prostration caused by the intense pain of the operations. It has led me to say, almost, that in view of the superior manner in which artificial dentures can to-day be introduced into the mouth, and made to serve the purpose of mastication so well as they do, that I would rather have every tooth out of my head and artificial

teeth, upper and lower, put in, than to go through what some patients of mine have gone through in the last few weeks. I have had in my hands patients with 15 or 25 natural teeth, and every one of them having a cavity to be filled, being terribly sore and painful, with such a fearfully diseased condition of the mouth and its secretions, that all the therapeutical treatment that could be given could only afford temporary relief, and the teeth so poorly organized soft and chalky, that every few months they must go through this fearful ordeal again. And as I said, where a set of artificial teeth can be introduced to serve so well the purposes of the natural, I would rather have all my natural teeth out than go through what I have put some of my patients through in the last few months.

DR. RYNEAR, of New York: The point in the paper just read that impressed me more than any other is that the gentleman seemed to think that operative dentistry was held in higher esteem than mechanical dentistry. I may remark that I am very happy to see that it is. It is evidence that we are making a proper advance in the profession and getting away from what I consider the very dangerous principle that has been set forth, that artificial dentures are preferable to the natural teeth when the latter are properly attended to, and it is to be presumed that all gentlemen holding diplomas in dentistry are capable of saving the teeth when called upon, except in extreme cases; and where the natural teeth can be retained in the mouth there is no question in my mind but that they should be retained, even when the artificial dentures come as near to the natural teeth in usefulness as we can hope to have them. There is no question but that operative dentistry should be held in much higher esteem than mechanical dentistry, which at best gives us but a substitute for natural organs that have been lost. The man who in the practice of his profession makes it his purpose to save the natural teeth and not extract them, very seldom has a case come into his hands in which he cannot save the natural teeth; perhaps it is not universally true now, but with a proper advance in our profession it will be so in future years. With such skillful men as Dr. Atkinson, Dr. Brown, and others among you, it is true now that the teeth can be saved when in the most distressing condition. Of course there are conditions where the teeth cannot be saved altogether, where the system is at fault, but where it is a matter of

caries only they certainly can, and it seems to be a very criminal act to give out the idea that it is better to extract the natural teeth than try to save them.

DR. E. PARMLY BROWN, of New York: I feel that it is necessary to make an apology for the gentleman from Brooklyn. I do not want the State of New York to be understood by the gentlemen of New Jersey, who have treated us so kindly, as holding the sentiments expressed by the gentleman from Brooklyn. We regard an artificial tooth as we do an artificial leg, a very good substitute for a lost member, but we would not cut off a leg to cure a corn. It strikes me that my friend must have hunted far to find so many people crying with sore mouths. I cannot find them, and I work in the same malarious district that the gentleman does. They do not come to me in that condition. Their teeth can be saved, the most delicate, white, chalky teeth can be saved, all of the 32, every man, woman and child of them, and you need not pull them out.

DR. STOCKTON: I was surprised that Dr. Atkinson let the matter pass after the sentiments expressed by the gentleman from Brooklyn. To my mind there is nothing so grand in dentistry as saving the natural organs. The people do not usually value their teeth as highly as they ought, but one gentleman recently said to me that five hundred dollars a year would not compensate him for the loss of a single tooth which he had lost, and which was the only tooth he had remaining in his lower jaw. There are too many teeth taken out. In the lower jaw especially, if you have a good tooth, if it is only a wisdom tooth, I say keep it in. Artificial teeth cannot be made to serve as well as natural ones, and there are very few teeth that cannot be saved. There was the case that I reported last year, of a gentleman who had the roots of a lower molar fully separated and one of the roots was loose. I inserted a screw into the solid, good root, put on one of Richmond's crowns, and that tooth is there to-day and doing as good service as any tooth he has in his mouth. That is as hopeless a case as you would be likely to find anywhere.

DR. SHANNON: I see Dr. Stockton's 500, and go him 500 better, on a case that came to me of a lady who had had her teeth filled; they decayed, were refilled, and decayed again, and eventually she had them all out. I was not the operator in either case.

She had a set of artificial teeth made, and subsequently said to me: I would not have my teeth back again if you were to give me $1,000—I am a happy woman to-day.

In reply to the gentleman's statement as to how easily the natural teeth can be saved, I will mention a case in point: that of a patient who was in my office yesterday. The lady has been in the hands of a dentist who is supposed to be one of the best operators in New York City. He did for her some of the most magnificent work ever put in any mouth in that city, yet in about one year afterwards she had five volcanoes belching forth pus and blood. She was in bed for two weeks together. She had her teeth taken out two years ago, and she told me she would not have them back again for $5,000.

DR. BROWN: The manner of curing a simple abscess is just as easy as picking your teeth. Put the tooth under favorable conditions, and it cures itself. In nine cases out of ten, on removing the pulp I fill the tooth to the apex without any other treatment whatever, and nature cures perfectly; better than if she was interfered with by the use of painful irritants.

The great mistake we make is in putting the forceps on the first tooth and breaking into the arch. It should not be done, unless it is a crowded jaw. If we only hold on longer and search faithfully, we shall find a solution of the difficulty and a means to cure that tooth.

I had a case of a young lady, a very good patient, who had been under my care, and whose teeth I had fixed ever since they were fixed. The right upper second and third molars had dead pulps, and I had filled them properly to the apex of the root with Hill's stopping, but a year after I filled them she came to me with her face swollen, and the right eye closed. I looked at the fillings; they were all right, and I examined with instruments, but I was at sea; I could not diagnose the case. I treated it—it is not necessary to state what the treatment was—but the swelling went down and pus began to exude between the first and second right upper molars. Now, before I go further with the history, I would like to have Dr. Atkinson diagnose the case from those symptoms. What would you predict, doctor?

DR. ATKINSON: A foreign substance.

DR. BROWN: Well, I searched for dead bone, and I searched in

vain. The swelling went down, but in about six months she came back and wanted the tooth pulled. Pus was then exuding between the teeth. I said, hold on awhile; I don't want to pull a tooth unless I know why I pull it, and in this case I did not know. I opened channels again through the apex of the roots, but it did not seem to help it any. I tested the first molar for death of the pulp, and it responded very sharply; I found it was alive. It had a gold filling. She would not have the tooth out as long as I said not to, and she went away. Two or three weeks ago she came to me, saying the tooth was very well then, but that she had had two or three cases of inflammation since I saw her, and that just as she made up her mind to come to me they got well. I shortened the tooth a little, as I had done before, and I made up my mind to go up there again and try to find out what was the matter. I did so, and I pulled out a fish bone as long as an ordinary pin with a head on it. Three dentists had advised her to have that tooth out, saying there was dead bone in there.

DR. ATKINSON: I meant just what I said. I suspected not particularly a fish bone, but that something had slipped up, as the fish bone had, which nature was dissatisfied with, and was trying to throw out; and so it proved to be a foreign substance, and from the fishy kingdom. Sometimes a natural is converted into an unnatural substance in the tissues. If it had been in soft tissue it could have encysted itself and not been troublesome, as many soldiers carry balls so encysted in various parts of the body. But this was something that nature could not encyst and could not throw out. Why? Because it was embedded in connective tissue near the bone. If it had been in the myxomatous or gum tissue, it would have been thrown out or encysted.

In regard to the remark of Dr. Stockton I have only to say that so much ignorance is revealed in speakers about the very business they have in hand that one needs to be forbearing. If I were a master-builder to take down and rebuild professional edifices, I am afraid a good many of my brethren would not recognize their size in the new structure. If you knew how I dread taking out a human tooth you would not think I have need to apologize for that iconoclasm.

Dr. Brown struck the right point when he said we should not

take out the first tooth except for purposes of regulation. The teeth are like the staves of a cask; when you break up their occlusion they fall to pieces, therefore that occlusion should not be broken up if it is possible to avoid it. I have to wear artificial teeth, although I have a splendid organization and there was no necessity for it all. If we have one duty more imperative than another as dentists it is to save the natural teeth.

DR. A. W. KINGSLEY: One point pertinent to this subject has not been touched upon at all, and that is the gradual and constant absorption of the jaws, that goes on from the time the teeth are taken out until the death of the person. I have given the subject much attention. About thirty years ago a young lady came to me to get an upper set of artificial teeth. She had had seven sets made by other dentists and never could wear one of them. She was not over 25 years old at that time, and when her teeth were taken out she was 16; and that was the commencement of the difficulty. The jaw had contracted so that it was more like a dog's tongue than a human jaw in shape. I had a great deal of trouble to make a set of teeth that she could wear. Since then I have been very careful about extracting teeth, especially in young persons. A few days ago an old lady came into my office, for whom I had made a set of teeth 25 years ago, when she was about 17 years old. I was obliged to tell her that I could do nothing for her, because her jaw was all absorbed, so that where once was an alveolar ridge, there was now an alveolar depression; there was no chance to insert artificial dentures. And our young patients whose teeth we extract will come to that condition if they live to be old. It is the wickedest thing that can be done to take out teeth that can be saved.

DR. WATKINS: I regard artificial teeth in the same light as an artificial leg or arm; a very good thing if you are obliged to have it. Why not have your little toe cut off when you have a corn on it? It is of no more use than a wisdom tooth, if anything the wisdom tooth is the more valuable. I think it is best to save the teeth wherever it is possible; and if you cannot save a tooth the first time you try, keep trying. I have a case of exposed pulp that I have been treating for three months; it is about well, and I expect to fill the tooth in a few days, and that it will be saved.

UNITED STATES POSTAL LAWS.

1. A postmaster is required to give notice *by letter* (returning a paper does not answer the law) when a subscriber does not take his paper out of the office, and state the reasons for its not being taken. Any neglect to do so makes the postmaster *responsible* to the publishers for payment.

2. Any person who takes a paper from the post-office, whether directed to his name or another, or whether he has subscribed or not, is responsible for the pay.

3. If a person orders his paper discontinued, he must pay all arrearages, or the publisher may continue to send it until payment is made, and collect the whole amount, *whether it be taken from the office or not.* There can be no legal discontinuance until the payment is made.

4. If the subscriber orders his paper to be stopped at a certain time, and the publisher continues to send, the subscriber is bound to pay for it *if he takes it out of the post-office.* The law proceeds upon the ground that a man must pay for what he uses.

5. The courts have decided that refusing to take a newspaper and periodical from the post-office, or removing and leaving them uncalled for, is *prima facie* evidence of intentional fraud.

MISCELLANY.

A NEW COMPOUND.—A new metallic compound, applicable to many artistic and industrial purposes, has been recently announced in England. The substance belongs to the class known as the thiates, or sulphur sulphides. Nearly a year ago Mr. J. Berger Spence discovered that sulphides of metals, combined with molten sulphur, formed a liquid. This liquid on cooling became a solid, homogeneous mass, possessing great tenacity, and having a peculiarly dark gray, almost black color. It has a comparatively low melting point, namely, 320° Fahr., or rather more than 100° above the temperature of boiling water. It would thus require only a small amount of fuel to reduce or to melt it. The new compound also expands on cooling—a property not shared by the majority of

other metals or metallic compounds. For such purposes as joining gas or water-pipes this expansion is of great importance. It is also claimed that the new compound resists favorably atmospheric or climatic influences, as compared with bronze or marble, and that its resistance to acids is much superior to that of other metals or metallic compounds. These qualities, if sustained by further experience, would certainly render the new compound very useful in many ways.—[*Scientific American.*

HARDENING SMALL TOOLS.—It is said that the engravers and watchmakers of Germany harden their tools in sealing wax. The tool is heated to whiteness and plunged into the wax, withdrawn after an instant and plunged in again, the process being repeated until the steel is too cold to enter the wax. The steel is said to become, after this process, almost as hard as the diamond, and when touched with a little oil or turpentine the tools are excellent for engraving and piercing the hardest metals.—[*Scientific American.*

EDITORIAL.

DR. TANNER'S FAST.

It will be generally admitted that there are but few men capable of controlling the demands of appetite to the extent requisite for carrying one through an abstinence from food for so long a period as forty days. The will and determination necessary to such an accomplishment are rare qualities, yet there can be no doubt but Dr. Tanner possesses them in the highest degree.

The consumption of the constituents of the body necessary for the support of life, through this long period, must have reduced the supply very nearly to the starvation point. The maintenance of animal heat must have drawn heavily upon the supply of carbonaceous compounds stored up in the body. The consumption of the nitrogenous elements required to sustain the involuntary muscles was necessarily as constant as that for the production of heat. To this amount must be added that which was expended by the volun-

tary muscular system. All this waste resulting from the consumption of nitrogen, must be carried away by the blood and be excreted through the kidneys. The compound excreted is called urea, its chemical designation is cyanate of ammonia.

Then there is another important constituent that is being constantly consumed for the purpose of keeping up the activities of the brain and nervous system. That element is phosphorus, which, combined with such bases as sodium, magnesium and calcium is also constantly excreted by the kidneys. The amount of the renal secretions of course steadily decreased throughout the term of the fast. These substances are all contained in what we call food, and were not supplied by the water taken during the fast. We know from daily experience that nature demands new supplies of these substances at periods of no very great length; and that the demand becomes urgent if the intervals of supply are extended much beyond the usual time. When we compare the frequency with which our own supplies are taken, with the long period of abstinence maintained by Dr. Tanner, we can imagine the firmness and self-control which were necessary to carry him through the full term of his experiment.

THE AMERICAN DENTAL ASSOCIATION.

The annual meeting of this body was held at Boston, beginning on the 3d inst. The attendance was larger than usual, and the meeting was a very successful one. An extended summary of its proceedings will appear in future numbers of the JOURNAL. The association declined to unite with the American Dental Convention and the National Dental Association in the formation of a new society, which should comprise the membership of the three associations above named, preferring to maintain its present organization.

The officers chosen for the ensuing year are as follows:

President, Dr. C. N. Pierce, of Philadelphia; First Vice-President, Dr. W. C. Barrett, of Buffalo, New York; Second Vice-Presiden, Dr. George J. Friedrichs, of New Orleans; Recording Secretary. Dr. George H. Cushing, of Chicago; Corresponding Secretary, Dr. A. M. Dudley, of Salem, Mass.; Treasurer, Dr. W. H.

Goddard, of Louisville, Ky.; Executive Committee, Drs. S. G. Perry, of New York; W. H. Morgan, of Nashville and T. T. Moore of Columbia, S. C.

The next meeting is to be held in the city of New York.

REMOVAL.

The removal of the Dental Depot of Messrs. Alex. Heburn & Co., from 416 Olive street to No. 919 on the same street, was mentioned in our last issue. We now take occasion to add that their new rooms are on the second floor, provided with ample windows, and with every convenience for the successful conduct of their business. Mr. Heburn being a practical dentist, is familiar with the wants of the trade, and is qualified to judge of the merits of newly introduced articles. His long experience and well-known industry will, no doubt, attract a liberal share of patronage.

A NEW NATIONAL ASSOCIATION.

The American Dental Convention and the National Dental Association met in the city of New York and held a joint session, when the organization of a new National Association was effected. We have no particulars at the time of going to press.

JOHNSTON'S CONE JOURNAL HAND PIECE NO. 2.

On the inside cover will be found a cut of this new hand piece. We have used one for some time past and unhesitatingly pronounce it the best running hand piece we have ever used.

NEBRASKA STATE DENTAL SOCIETY.

The fourth annual meetingof the Nebraska State Dental Society will meet at Omaha, Tuesday, Sep't 21, 1880, at 7 30, P. M.

W. F. ROSEMAN, Rec. Sec'y.

BOOKS AND PAMPHLETS RECEIVED.

We are indebted to the enterprising house of Messrs. Ransom & Randolph, of Toledo, Ohio, for TRANSACTIONS OF THE OHIO STATE DENTAL SOCIETY, for the years 1875–76–77–78 and '79, for which our thanks are due to the firm.

MONTHLY WEATHER REVIEW, with Charts. War Department, Washington, D. C.

REGISTER OF THE VANDERBILT UNIVERSITY, of Nashville, Tenn., for 1879–80, and Anouncement for 1880–81, accompanied by a beautiful engraving showing the grounds and buildings of the University. The Dental Department of this institution appears to have made a very promising beginning. The MISSOURI DENTAL JOURNAL wishes this and all other new colleges ample success.

CIRCULAR OF HOROLOGICAL AND THERMOMETRICAL BUREAUS OF THE WINCHESTER OBSERVATORY OF YALE COLLEGE. Thermometers, clinical, standard and ordinary, will be verified by the Thermometric Bureau for a moderate charge.

LUCIE RODEY. A Society Novel. BY HENRY GREVILLE. Translated by MARY NEAL SHERWOOD. T. B. Peterson & Bro., Philadelphia. Price 50 cents.

A charming novel, written in a graceful yet vigorous style. Probably no French authoress of to-day equals Henry Greville in versatility and power.

THE 38th CATALOGUE OF THE STATE UNIVERSITY OF MISSOURI, 1880.

INVESTIGATION OF THE ALBANY MEDICAL COLLEGE. Report of the Special Committee of the Common Council of the City of Albany, on the affairs of the Albany Medical College and the removal of Dr. John Swinburne.

THE AMERICAN MEDICAL COLLEGE ASSOCIATION, fourth annual meeting, held at New York City, May 31st, and June 1st, 1880.

MEDICAL SCHOOL OF THE MISSOURI UNIVERSITY, at Columbia, Mo. From the Report of 1879-80.

THE MISSOURI
DENTAL JOURNAL.

A Monthly Record of Dental Science and Art.

VOL. XII.—SEPTEMBER, 1880.—NO. 9.

[Continued from August number.]

MINUTES OF TRANSACTIONS OF THE SIXTEENTH ANNUAL MEETING OF THE ILLINOIS STATE DENTAL SOCIETY.

BY EDMUND NOYES, Secretary.

SOME POINTS IN THE NATURAL HISTORY OF CARIES OF THE TEETH, AND THE VALUE OF FILLINGS FOR ITS ARREST.

BY G. V. BLACK, D. D. S., OF JACKSONVILLE, ILL.

Perhaps the best way to estimate the value of fillings, is to study the results in connection with an extended study of the habits and tendencies of caries of the teeth when allowed to pursue its course. The best results in the study of medicine within the last half century, have been obtained by the close observations made on disease, which has been allowed to pursue its course without therapeutic interference. By this means many errors of opinion respecting the tendency of individual diseases have been corrected, and a better knowledge of them arrived at. Indeed it is now recognized that in order to know a disease well, it must be studied without therapeutic interference—by no other means can we so certainly arrive at its

true nature, habits and tendencies. Having thus gained an understanding of the disease, we are ready to note understandingly the modifying influence of drugs—not before—for certainly we cannot be supposed to understand what good or evil a drug has done in changing the course of a disease, if we have no real knowledge of the course of the disease when not modified by drugs.

Each disease has its habits and tendencies, which are more or less fixed, and each case pursues a course very similar to each other case of like nature or type. Each specific disease also arises from a specific cause; always from that one cause, and from no other, as certain as an oak arises from an acorn, or a bird from an egg. In this catalogue of specific diseases, we, of course, do not include those accidental diseases which run no specific course, and probably arise from causes purely accidental. Yet it is well understood that the progress of discovery is continually transferring important lesions to the list of specific diseases.

Decay of the teeth is certainly a specific disease, running a specific course, and evidently arises from a certain specific cause, but this cause is not as yet certainly known. It may be regarded as a malignant disease, in that its general tendency is to the entire destruction of the organ attacked. This malignancy, however, receives a decided check in the fact that there is absolute immunity for all the other organs of the body than the teeth, hence the disease is always strictly localized. Whether its specific cause be local or general, is not yet certainly known. Not being able to trace the cause, our only knowledge of the disease is its phenomena, and it is to these phenomena that we now wish to direct attention. In this paper we can only glance at a few points. It was no part of the plan of this paper to enter into a discussion of the *cause* of decay, but I may be pardoned for introducing a few propositions on that subject, which will in some measure represent my conception of the facts now known to me.

1. There is no decay without an acid condition of the fluids of the mouth.

2. If acidity alone be the cause of decay it must be due to state or condition of the acid not yet known or recognized.

3. While an acid is not only always present, but is probably a necessity to the inception and progress of decay, there may be an

agent acting in conjunction with the acid that is not yet known or recognized.

4. While there is no decay without the presence of an acid, there is not necessarily decay because of the presence of an acid.

5. Decay is in no wise dependent upon the physiological perfection or imperfection of tooth structure any farther than that imperfections of the surface of a tooth may afford favorable points for the beginnings of decay.

6. The force of vitality has no influence in the prevention of decay. But in living dentine decay progresses less rapidly, probably because the tubules being perfectly filled with the fibrils, tends to prevent the ingress of the materies morbi, and in this manner limits the surface upon which it may exert its influence, and more rapidly in soft teeth than in hard ones, because there is less basic substance to be broken down.

My object in experimenting with acids in motion, of which a partial report was made to the American Dental Association, also to the Mississippi Valley Dental Association, was to see if this change in the condition of the acid would produce a change in its action. My observations had led me to the conclusion that certain changes would be produced. The result of the experiments, while they demonstrated a change of action, showed a different change from that anticipated by me before beginning. All my efforts to detect a special agent acting jointly with an acid for the production of decay, has so far entirely failed. I have never been able to satisfy myself, either by experiment, observation, or otherwise, that *Leptothrix Buccalis* or other fungi demonstrable with the microscope acted as such morbific agent, or stood in the relation of causation to decay of the teeth.

We will now leave the causes of decay entirely, and in the rest of this paper we will regard it simply as the result of a force, without reference to the cause or origin of this force.

Decay is disintegration of the tooth substance, molecule by molecule. It always begins on the surface of the tooth and slowly makes its way toward the central parts, spreading as it proceeds. The dentine is destroyed more rapidly than the enamel so that in most instances the dentine is burrowed out beneath the enamel in

such manner that the diameter of the cavity just within is larger than the opening.

Decay has pretty definitely fixed habits as to the point upon a tooth that is attacked, and one of the most notable characteristics is that it never attacks a tooth upon a surface that is smooth and is constantly worn or is kept clean by the attrition of mastication, or the friction of the lips, cheeks or tongue. All such points are absolutely exempt from attack.

The points of attack may be divided into four classes:

1. Pits and grooves in the enamel.
2. Approximal surfaces.
3. Points which are from any cause habitually unclean.
4. At the junction of the cementum and enamel.

The *first class* is usually the first to make its appearance. It occurs in the pits and grooves of the enamel wherever found. In the molars, in the pits and grooves of the grinding surface, and in the groove which is often present in the buccal surface. In the bicuspids, in the pits and grooves of the grinding surface. In the incisors, in the pit often present in the lingual surface. In pits and grooves, the result of faulty formation in any of the teeth.

The *second class* occurs in the approximal surfaces of any or all of the teeth below the junction of the cementum with the enamel, and is usually the second to make its appearance.

The *third class* rarely makes its appearance except in uncleanly mouths or among those who habitually sleep with the mouth open. Their position is the smooth surfaces—usually the buccal or labial—of any or all of the teeth below the junction of the cementum with the enamel.

The *fourth class* is always accompanied with diseased gums, which has usually caused more or less exposure of the cementum and has its beginning just at the joining of the cementum and enamel. It is most generally seen in middle life or in old age. Very rarely in children or young persons.

The first two classes belong to youth or early maturity. If they are not seen until later it is on account of their slow progress. After watching this point critically, I have become satisfied that very few decays in these positions originate after the age of twenty-

five years; and as these comprise about ninety per cent of all decay, we may conclude that caries of the teeth, in its inception at least, is a disease of youth.

We wish now to call especial attention to two points. We all know that mouths are frequently met with in which there are many decays, which at middle life have not progressed so far as to do material injury. Many points have been attacked, but the destructive process has been extremely slow. Again we often find dentures in which very few decays have started, but these few have progressed with great rapidity, and several teeth have been lost, while perhaps all, or nearly all, of the remaining ones are free from decay. There are the following variations:

1. Cases in which *few* decays start and the destructive process is *slow*.

2. Cases in which *many* decays start and the destructive process is *slow*.

3. Cases occur where few decays start and the destructive process is rapid.

4. Cases occur where many decays start and the destructive process is rapid.

To represent these characteristics, we propose the terms "vis inita," beginning-power—from *vis*, power, force; and *ineo*, to begin—and "vis deleta," destroying-power—from *deleo*, to blot out, to destroy. With these words representing the quality of the power of caries, we may associate numbers to represent our conception of the degree of that power in a given case.

The following are the extremes of possible combinations:

Vis inita 1, with vis deleta 1 to 100.

Vis inita 100, with vis deleta 1 to 100.

For some years past we have made a special study of some of these characteristics of decay, particularly those of which we now speak, and we are satisfied that a more close and thoughtful study of them will be of very great benefit, both to operator and patient, and at the same time serve to correct many misapprehensions as to the real value of fillings. And we have thought that the selection of some simple words not in common use, which might be clothed with a specific meaning to represent them, would not only be acceptable but helpful.

Now, as to the character of these powers, we do not for a moment wish to be understood as attributing the beginning of decay; the vis inita, and the destructive power, vis deleta, to different causes, but should rather say that these are manifestations of one force, but of different qualities of that force, or manifestations under differences of environment. In the one case the action is on the surface of the tooth, or in a shallow pit or groove, where the general fluids of the mouth have tolerably free access to the part or tissue being acted upon, while the other is much more secluded from disturbing influences—is deeper in the tooth—more hidden away. Again, the vis inita is exerted for the most part upon enamel, while the vis deleta is spent mostly upon the dentine, or with our present lack of knowledge of the cause of decay, it might be regarded as an arbitrary division for the study of phenomena. Whatever may be the cause of these differences, it is clear enough that they exist and modify powerfully the conditions under which we are called upon for dental operations, and exert a great influence upon the value or protective power of fillings.

It is not uncommon to find persons who have had no dental operations whatever, with some teeth missing, or only roots remaining here and there through the mouth. An examination proves that most of the other teeth are free from decay. The teeth that are wanting have been attacked and quickly destroyed by decay, while the remaining ones have not been attacked at all. In this case we would say, perhaps, that there was vis inita, 25; vis deleta, 90.

In another case we may find the denture of a patient at middle life with many small, dark cavities, none of which have progressed so far as to give any trouble. For the practical purposes of mastication the teeth are as yet uninjured. Only a short time ago I examined such a case, in which I should say there was *vis inita*, 80; vis deleta, 10. Many decays had started in the teeth, but that power which drives on to quick and sure destruction, which we so often see to our sorrow, was wanting.

It was very different with a pair of twins, 18 years old, Swedish girls, who came to me for advice, last October. In the mouths of these girls there was not a tooth, except the wisdom teeth (which were not yet through the gums), that were not attacked at from one to four points; not a tooth which was not from one-half to three-

fourths destroyed by caries; in nearly every tooth there was a living exposed pulp. This, as being the most complete case of destruction I have ever met with, I should place vis inita, 100; vis deleta, 100, as the proper expression of the activity of the forces there in operation.

We need not continue the recitation of these cases farther at present, as we think our meaning will be readily understood; but will now turn our attention to the modifying influence of age, or the different expressions of these powers usually found at different periods of life.

Decay of the teeth is essentially a disease of youth. Especially is this the case with the first and second classes of decay—those starting in the pits and grooves and on the approximal surfaces of the teeth, and to a somewhat lesser extent with the third class. With these, the first and second classes, the vis inita is most strongly manifested before the age of twenty years, and grows less and less active after that age; and perhaps ceases altogether as early as the fortieth year, except in occasional cases. As the first two classes include most of the cavities met with, we find that if the decays occurring up to this time are successfully protected by fillings, the work of the dentist is about accomplished.

With the vis deleta the case is very different—this may continue for a much longer period. It is less modified by age. We well remember a case which came under our care fifteen years ago. We all remember such cases. The patient was a maiden lady, twenty-eight years old. The vis inita had been very strong as was evident from the fact that almost every tooth remaining in the mouth—five had been lost—had been attacked at from one to three points, except the lower incisors. The vis deleta was less strong, say fifty, but by this time had made sad havoc, as the previous attempts at filling had not been very effectual. The patient wished to have the teeth out and try artificial ones. We protested and made fillings instead. Since that time no new cavity has occurred. Eight years afterwards she was married and has borne one child. During this pregnancy two of the cavities, the fillings in which had been observed to be slightly leaky at the margins, flamed out into rapid decay (vis deleta, strong). These points were attended to and no decay has occurred to this day. (These were not plastic fillings.) In

this case the vis inita had become almost or quite nothing, with possibly a diminishing of the destructive force, and the remaining vis deleta was mastered by reasonably good fillings until an increase of this force, during pregnancy, searched out and exposed the weak points. Three younger sisters of this patient came under my care at the same time. For them I made many fillings, but no tooth has been lost, and for the last five years no filling has been needed.

We might cite very many cases to show that the beginning powers of decay is exerted mostly in youth, but deem it unnecessary. The time at which teeth are attacked varies very much in different cases, depending seemingly upon three conditions

The first is the vis inita, second the physical perfection of the surface of the enamel; third, habitual cleanliness. It will be readily seen that teeth with deep pits and fissures will be attacked in the presence of a weak or moderate vis inita, when teeth of greater physical perfection would escape attack altogether. The same is true of teeth habitually unclean as compared with those that are clean. Both of these conditions vary the manifestations of the vis inita powerfully, favoring it in the one case and disfavoring it in the other. Therefore we have these three considerations before us in the study of the beginnings of decay. If the vis inita is naught we will have no decay. We must have a power or force acting to initiate the process. Mere pits, grooves, or other faulty formation, nor even uncleanness will induce it, unless, indeed, uncleanness carries with it the materies morbi. While if the vis inita be present, these circumstances will favor or disfavor its manifestation, and if the teeth be unequal in surface perfection, or habitual cleanliness, the expression of the vis inita will be unequal.

As we have said, this force is manifested mostly in youth, and when it is strong the teeth are attacked usually at about a certain time after coming through the gums. That is, if the first molar is found with a decay in its grinding surface two years after coming through the gums, or at eight years, the second molar is likely to have a similar decay when about the same age, or when the patient is fourteen years old. If the incisors have approximal decays five years after coming through, the bicuspids and first molar are likely to have approximal cavities at about the same time after they present themselves, or possibly the first molar may be attacked while

approximating with the second deciduous molar, and so on with the other teeth in their turn.

Thus we see why it is that we have new cavities occurring continually between the ages of ten and twenty especially, and sometimes continuing until later in life, when the vis inita is less pronounced or more fluctuating. Of course we only present this as the most general rule to which the exceptions are sufficiently numerous. The modifying influences of surface perfection and cleanliness have their weight, which is often very powerful, in modifying the results, and if these are unequal among the different teeth, the manifestations will be unequal. After these come changes of condition as to health with their modifications; conditions which we need not now discuss, as we have considered them at length in a former paper. We will also find that the vis inita often begins to diminish very early in life, so as to lengthen the time between the occurrence of cavities in the different teeth.

Running all through our cases, however, there are many exceptions and exemptions. For instance, the lower incisiors are exempt from decay in a very large majority of cases. This is so very decided that we not unfrequently find them sound when all the other teeth have been destroyed. Again, it may happen that some other class of teeth are especially exempt, as the superior incisors, or the canines—occasionally the bicuspids—but very rarely the molars. The wisdom teeth, too, often decay much earlier proportionately, than the other teeth, probably from some peculiarities of environment. All this tends to cover up and conceal the laws of which we have spoken. But when we come to compare a large number of examinations, or better still, to follow a large number of patients from childhood to middle age, the general rule stands out clearly and unmistakably.

The vis deleta—destroying power—of caries is also subject to various local modifying influences. It is especially and powerfully modified by the condition of the cavity as to its opening, progressing far more rapidly if the opening be small than if it be large, so as to give free ingress and egress to the fluids of the mouth. Indeed if the vis deleta be rather weak, decay, which is moderately progressive in a cavity, the opening of which is small, or partially closed, will

cease altogether, if it be thrown wide open to the fluids of the mouth. Just here there is a very curious phenomena, which I have studied with much interest. Decay seems to be like the miner cutting coal. To work to advantage he must have a certain amount of room in which to handle his pick. If you cramp him he will go very slowly until he gains room for himself, then he will proceed rapidly with his work. It is just so with decay. While it is true that to progress most rapidly, the opening of the cavity should be partially closed, a moderately close filling of the cavity will interfere with progress for a time, until elbow room—if I may use such an expression—is gained.

It is for this reason that leaky fillings seem to protect for a time, especially in those cases in which the vis deleta is rather weak. However, if the vis deleta be strong, say 75, elbow room (figuratively) is gained so quickly that the decay seems to go right on without check.

Many noticing this in cases of very mild vis deleta, have come to the very erroneous conclusion that it was not necessary that fillings be water tight.

The changes in the destructive power consequent upon the breaking away of the wall of the cavity, and thus throwing it wide open to the fluids of the mouth, and still better to the attrition of mastication, we have seen exemplified in many ways. I was particularly struck with this last summer in my examination of the old Indian remains on the Mississippi. I spent some weeks in the work, and the results developed some curious facts not before known to me. One of these was the greater prevalence of decay among them than I had previously supposed. The second was the peculiar character of the decay. In a large majority of cases it was confined to the second class, nothing found but approximal decays. A very large proportion of these progressed until the over-laying enamel gave way, and then the hard food wedging into this broke out one side thus exposing the cavity to the attrition of mastication, which, with them, was sufficient to keep it clean and the decay came to a full stop leaving the teeth practically uninjured.

I did, however, find some dentures that had been practically destroyed. One, especially, of a young woman—the wisdom teeth

just coming through—in whom the teeth were nearly all destroyed. There were also evidences of very severe alveolar abscesses which had made extensive burrows in the bony tissues.

This Indian girl seems to have been especially unfortunate, as she had had one femur and both bones of the forearm broken. The femur had healed with two inches shortening, and the arm with about one inch, and quite crooked. I also found a child six years old, with the temporary teeth very badly decayed.

The peculiarities above mentioned, of decay among the Indians, is sometimes seen among our own people. Decays are only found on the approximal surfaces, and the vis deleta being very weak the cavities are broken into before exposure of the pulp takes place and the decay comes to a full stop. The teeth are thus preserved through these natural and unaided processes. Such cases have occasionally come under my observation, as they doubtless have of most dentists of long experience.

Decays arising from want of cleanliness vary greatly as to time of life, but I am convinced that they occur mostly in youth or early maturity. How many decays of the first and second classes are really due to this cause is, of course, very difficult to estimate. I therefore include in this class only those that occur on the smooth and exposed surfaces of the teeth. They are seen mostly on the labial surfaces of the incisors and the buccal surfaces of the bicuspids and molars below the margin of the gum, always below the junction of the cement with the enamel. I think that I have sufficiently demonstrated the dependence of these decays upon uncleanness, or a local modification of the mucus, in my repeated experiments. It is well known that in these cases the tendency is for tooth after tooth to be attacked in succession, spreading either way from the point of beginning (of course I do not allude to decays starting in congenital or other pits in these surfaces). I have uniformly found that the daily use of the friction of the tooth-brush would prevent more teeth being attacked in this way.

We have yet to notice the fourth class of decay—those that occur at the margin of the enamel, or at the junction of the cement and enamel. These are peculiar to middle life and advanced age, occurring but rarely in young persons. We believe that the immediate local conditions of their occurrence is to be found in disease of

the gingival margin of the gum, and perhaps the margin of the alveolar process. This is marked by a thickened and irritated condition of the gums at the point, and usually some shrinkage away from the tooth. Some years ago I was inclined to the opinion that this condition was caused by the sharp edges of the cavity, but longer and closer observation has fully convinced me that the disease of the gum is first present, and the decay follows. These decays are not confined to any particular side of the tooth, but occur on the proximal as well as on the buccal and labial surfaces. Such decays also occur frequently where a partial plate abuts against the teeth, causing continued irritation of the margin of the gums. They sometimes progress rapidly and are very destructive, tooth after tooth falling a prey to their ravages. It occasionally happens that after the danger from the first and second classes of decay has passed, this fourth class springs into existence and wrecks the whole denture. We have lost the battle in several of these cases; in others, we seem for the time to have won the fight; and we have now under our care, several cases in which we are several times per year filling decays of this class.

VALUE OF FILLINGS.

In considering the value of fillings, we must at all times keep clearly in view the nature and habits of decay; its phenomena and tendencies—its particular characteristics in each individual case. If we let this escape attention in any case presented, we will have nothing upon which to base just conclusions. For instance, if we should take a patient at middle age with a number of small, dark cavities, one in whom the vis inita is spent and the vis deleta is, and always has been very weak, and fill these cavities with amalgam, they would, if reasonably well done, remain good, and we might be inclined to point to the case as a grand success.

Again, let us take another case: The patient, a girl of fifteen or seventeen years, with a number of rapidly destructive decays, say vis inita, 50; vis deleta, 75, and make the best possible gold fillings in all apparent cavities. Within a few years this girl will most certainly show a number of decays advancing, and unless the fillings are absolutely perfect, there will be points about some of them that will need repair, or even if they be perfect, new points of decay are

liable to present themselves in the immediate neighborhood. Now, we might be inclined to regard this case as to some extent at least a failure. In comparing these two cases without considering the nature of the diseased action with which we had to contend, we would certainly conclude that the amalgam had been the more successful, and therefore the better material; when, in fact, the reverse is true. The protective power of the gold fillings has really been very much greater than that exerted by the amalgam fillings, as would be shown if the cases were reversed. In the first instance the vis inita having been spent, there was no inclination to the formation of new cavities, and the vis deleta having always been weak and growing weaker, would easily be controlled by fillings approximately good, while the other case required absolute perfection in the filling of the cavities apparent, with a certainty of the appearance of new cavities in the near future.

This study of the case in hand, with a clear understanding of the phenomena of decay in their several degrees of manifestation, is a necessity to any just conception of the protective power of fillings. A few years ago it was announced by some one that it was not necessary that fillings should be absolutely moisture tight. While this proposition is false both in principle and in fact, observations made without an understanding of the degrees of the manifestation of the forces of decay, or proper consideration of them might seem to support such a conclusion. Every dentist of long experience has seen fillings manifestly imperfect, leaky, with a brown streak passing into the cavity on one side which have stood so for years. There has been enough action to produce a stain—show the leak, but the vis deleta being very weak becomes like the aged and feeble *miner* wedged in between two solid walls with his pick, without proper room to wield it. He works away feebly for awhile but finally smothers and dies. If, however, the vis deleta be strong, it is more like the *miner* in the prime of his strength, who though crammed in a narrow crevice, soon gains elbow room and then wields his pick vigorously. Leaky, imperfect fillings afford protection only when but little protection is needed. Perfect fillings will afford protection to their cavities' walls under any ordinary circumstances.

The requirements of a filling of the strongest protective power are:

1. That the material be capable of *perfect* adaptation to the cavities' walls, and of retaining that adaptation indefinitely.

2. That it be sufficiently resistant to the fluids of the mouth.

3. That it be sufficiently resistant to attrition.

No filling material yet in use has any continued virtue by reason of its intrinsic qualities as a material other than these. It is only by virtue of adaptation to the cavities' walls and the exclusion of the materies morbi that protection is secured. Those who use any material with any other end in view, must certainly fail in the end, no matter how profound a study they may make of compatibilities with tooth-bone, dentos, or what not, and the further their material departs from the three essentials given above, the more signal will be their failure.

These conclusions are based upon the observations of the greatest number of the wisest members of the dental profession. Then we have had a tolerably large personal experience, and fortunately we have kept such records of our operations that we may know whereof we speak. Among these records the number of failures (we say it in sorrow) is ample for comparison with the successes.

The very best way of studying the value of fillings is to run over the records of those children who came to us years ago, and who have grown up to manhood and womanhood, to middle age, under our personal care. In studying these we must also estimate the value of the hereditary tendency of caries, for we all know that the especial liability to caries is more or less transmissible. Therefore, the history of the decay of the teeth of the parents must be known and considered. How many children have come under my care within the seventeen years that I have been in my present location, I do not know. Many come for a time and are gone and lost sight of, so that the number who have been constantly under my care and under the care of no other, is small, as I suppose it will be found to be with others. We can count about thirty who came to us at from eight to fifteen years old, and whose parents, one or both, had lost their teeth from decay. These patients are now from twenty to thirty-two years old, and not one of them, nor any other who has been regularly under my care from childhood, wears artificial teeth of any kind, or needs to wear them. Not a tooth has been lost that had not an exposed or dead pulp at the time we first saw them, ex-

cept such as were extracted on account of irregularity, *and no plastic fillings have been used.*

No table I am able to construct will give a fair showing of these cases. The vis inita differs very considerably, so that the decays have occurred at very different periods as to age, which would confuse any table we can devise. Perhaps I should, in justice to myself, say a word, before giving cases from my records, in regard to some of my habits of practice which probably differ somewhat from my fellow-practitioners. For instance, in case I conceive the vis inita to be strong, I never, or very rarely, make what is called a pit-filling in the grinding surface of either the molars or bicuspids, but when a filling is required in one pit, I cut away the other, and all radiating fissures, uniting them in one filling. In the approximal surfaces I cut away all the approximating surface whether the cavity be large or small. For these reasons the number of fillings is reduced, as I think, nearly, or quite one half from what it would be if I filled every little cavity and stained pit. We will now give a few cases illustrating the success that may be attained by fillings.

Miss F. came under my care in 1866; was at that time 14 years old. Her father had lost all but the incisors and cuspids, and these were each protected by fillings, both upper and lower. The mother had lost all but the incisors in the lower jaw and a part of the anterior teeth above.

Year	1866;	age	14;	5	decays of	1st class;	1	of 2d class;	Total,	6
"	1867	"	15	3	"	"	1	" "	"	10
"	1868	"	16	1	"	"	1	" "	"	12
"	1871	"	19	1	"	"	2	" "	"	15
"	1872	"	20	3	"	"	1	" "	"	19
"	1873	"	21	1	"	"	0	" "	"	20
"	1874	"	22	1	"	"	0	" "	"	21
"	1875	"	23	0	"	"	2	" "	"	23
"	1877	"	25	0	"	"	3	" "	"	26
"	1878	"	26	0	"	"	2	" "	"	28
"	1879	"	27	0	"	"	2	" "	"	30
"	1880	"	28	2	"	"	1	" "	"	33

There was one repair of a filling in 1867; 1 re-filling in 1871; 1 re-filling in 1872.

These re-fillings were in the first lower molars. In these the pulps were dead and alveolar abscess formed when the patient came under my care. The walls of the cavities broke away, and the crowns were cut down half way to the gums, and re-filled to that height, and they are doing duty in that shape. No other filling has been lost, no tooth has been lost, and there are now no imperfections worthy of notice apparent about the margins of any of the fillings. *No plastics were used.*

Miss S., aged 12 years. The mother wears full plates. The father had lost more than half of his teeth when he came under my care, and the rest were protected by about twenty excellent fillings.

Year	1870;	age	12,	2	fillings	first	class;	4	second class,	Total, 6
"	1873	"	15	4	"	"		2	" " "	12
"	1874	"	16	0	"	"		2	" " "	14
"	1877	"	19	4	"	"		6	" " "	24
"	1878	"	18	0	"	"		2	" " "	26
"	1879	"	19	1	"	"		1	" " "	28
"	1880	"	20	0	"	"		4	" " "	32

One re-filling in 1878; 1 re-filling in 1880.

The patient was married at 18 and has borne one child.

We give these cases from our record as fairly representing the average results in the thirty cases alluded to, and with these two, the whole number as representing the results that may be obtained with gold fillings, believing that no such success can be attained with any plastic material now known to the profession.

These cases though not the worst, are bad cases, as the number of fillings show, and all past experience proves that there would have been almost complete destruction of the teeth but for the fillings. The patients, however, have done their part of the work. They have obeyed instructions and have been prompt to report anything wrong, otherwise we believe such success unattainable with any material.

In several families under my care, a part of the children have been prompt while others have been neglectful. The difference in result is strikingly apparent, and we think demonstrates unmistakably that a larger number of decays will occur if cavities are allowed to progress unchecked.

My most signal failures have been in those cases that come to me with the teeth badly wrecked between the ages of 18 and 22, especially in women who marry young and bear children. In such cases I have learned to expect some fillings to fail and that new cavities will occur rapidly. A close watch must be had for several years in order to secure good results. It would seem as though with the unchecked riot of the carious process, an *intensity* is attained which requires an unusually great effort to check; and indeed it seems it cannot be checked at once, but must be brought about by a persistent effort. It may be compared to checking the movement of a ball that has acquired a great momentum.

Older patients with similar conditions as to the progress of the decay are easier to manage in proportion to the age (provided the decay be not of the fourth class), that is, given a certain amount of destruction by decay, the case is easier managed if the patient be 30 than if he be 18 or 20 years old.

We will give a case illustrating this point: A young lady, 17 years old, came under my care in 1870; four teeth were extracted, and fillings were made as follows:

At 17,	9	of the first class;			5	of the second class			.....Total,		14
" 20,	2	"	"	"	13	"	"	"	....	"	15
" 23,	2	"	"	"	0	"	"	"	....	"	2
" 24,	1	"	"	"	1	"	"	"	....	"	2
" 25,	0	"	"	"	3	"	"	"	....	"	3
" 27,	0	"	"	"	0	"	"	"	....	"	0
Totals,	14				22						36

One refilled in 1877.

Now, this patient returned three years after the first fillings were made with fifteen new cavities, with her teeth again in very bad condition, yet every filling previously made was perfect. It may be that a number of these new cavities were in progress, but as yet very slight, when the first fillings were made; but at the time nothing more was thought to be required than close watch for new cavities, which it seems the patient did not do. After the filling of these cavities the case seemed to be fairly under control, and I now suppose that a filling once in three or four years will be all that will be required. *No plastics.*

Another case: A lady came under my care, aged 28, at about the same time. The condition of the mouth was rather worse than the preceding. Eighteen fillings were made at first. After that time two fillings and two repairs complete the list of operations.

These cases illustrate the general rule, but of course we meet with exceptions. I have gradually come to understand that my better class of patients, who came to me as children and are prompt to report at the first intimation of anything wrong, cease to be remunerative patients after the age of thirty, provided that nothing but gold fillings have been made.

CONSERVATION OF THE TEETH.

BY W. H. EAMES, D. D. S., ST. LOUIS.

The conservation of the teeth is the principal object of the dentist.

From the earliest ages of our profession to the present, much of the thought and labor of the leading men has been devoted to the discovery of the best material and means for filling carious teeth, the result of which is seen in the various forms of gold, gold and platinum, tin and almost an endless class of materials known as plastics; and the numerous improvements in the means and methods of manipulation.

It is not the sole object of this paper to canvass the relative merits of the numerous materials for filling teeth in use at the present time. We purpose, rather, calling attention:

1. To the histological character of the dental tissues and their similarity and intimate relation with other tissues of the body.

2. The means by which a filling arrests caries.

3. To ascertain if we may, by comparison, which of some of the most prominent materials now in use, most nearly meets the required means

4. To offer a suggestion in regard to one of the causes of failure of amalgam as a filling material.

In dentistry, as in medicine, there is much empiricism. We make use of materials and methods of manipulation on the recommendation of others without understanding the why and wherefore; and expect success because Dr. A or B claims to have met with it, and

we reap failures which might have been avoided by proper study and thought.

If we would be successful in the preservation of teeth, we must take into consideration their physical character and the conditions surrounding them, and make use of such materials and methods of manipulation as are indicated in each individual case. Hence, we say, study, investigate and know for yourself the physical character of the organs you have to work upon, and the properties of the materials used for conserving them, in order that you may select that material and practice best adapted to each particular case.

What has science and the investigations of such men as Hunter, Tomes, Magitot, Carl Heitzman, Bodecker and others, revealed to us as to the character of the tissues of the teeth? Formerly these important organs were not regarded as a part of the living organism, but now we know them to be a very important part, highly organized and sustaining an intimate relation to other living parts, subject to the same laws of development and growth, decay and death. Being similar in structure, agents which cause the destruction of other hard tissues may effect alike these organs.

The teeth, like the bones, are composed of organic and inorganic matter. Similar in development, being built up by the impregnations of lime salts in a previously formed soft body. Like the bones, the teeth are ramified by living matter, from center to circumference. They are supplied with an investing membrane and a medullary substance occupying the center of each organ, which are intimately connected with the living matter, which ramifies the hard and soft tissues, and through which the nutrient fluid is conveyed to every part.

They differ from the bones in the amount of inorganic matter which they contain and in their histological character. They differ somewhat in their mode of growth and repair, and yet are sufficiently alike in these respects for us to recognize the same general laws governing each.

Teeth differ in character with age, physical condition, hereditary impressions, climate, etc. The teeth of the child contain a much greater per cent of living matter than the teeth of the adult, and the adult than the aged, corresponding in this respect to the bones. The tubuli are larger and the inter-globular spaces more numerous

and larger, the inter-tubular substance less dense. The teeth of the child are therefore much softer than those of the adult or aged, less resistant, more easily and rapidly affected by destructive agents, requiring much more care in the selection of a material that can be adapted to the walls of the cavity without breaking them or crumbling them, and in the preparation of the cavity, and in fact in all of the steps of the process of filling. Physical condition of the patient changes the character of the teeth, rendering them more or less susceptible to the destructive agents found in the oral cavity.

The teeth of our patients undergo a marked change, frequently from hidden causes, which hasten their destruction.

The microscope has revealed to us the fact that all portions of the tooth are not alike (some portions being much more dense and harder than others); that the cervical wall of the cavity in the proximal surface is much softer and less resistant than other portions; that the teeth of different persons of the same age differ in density.

Recognizing these facts, as I believe you all do, you must agree with me in your estimate of the importance of observing them, and adopting our material and practice to meet the requirements of existing conditions, if we expect any measure of success. We will assume that the conservation of carious teeth by filling is purely mechanical; that the filling does not act in any way as a prophylactic. The success of a filling then depends solely on its being perfectly moisture-tight. A material for filling must possess certain properties. First, it must be soft enough to permit of its perfect adaptation to the walls of the cavity without breaking or crumbling the softest structure, and yet hard enough to resist the pressure in mastication; it must be non-oxidizable and a non-conductor, not subject to change; in color it should harmonize with the color of the teeth. So far as I know, we have no material that meets all of these requirements. Gold in some of its forms meets, I believe, the most of them; has been longer and more generally used, and has saved more teeth than any other material. Gold was used for this purpose as early as the *fifteenth century* by Ercolani, an Italian surgeon.*

*Compendated History of Italian Surgery, by Professor Carlo Burci; published in the beginning of the nineteenth century.

From that time to the present it has been regarded as the best material we have for this purpose. I know this is not in accord with the creed of the "New Departure," but as the new creed has not been accepted by the majority of the leading men of our profession, we are still inclined to place our old friend in the lead. Tin comes next in our estimation of a material for filling. Soft, non-oxidizable, and particularly adapted for the soft teeth of children and the cervical borders of soft teeth. Tin, like gold, is an old and trusty servant, and has been the salvation of many a carious tooth, but I regret to say it has been supplanted almost wholly by its unworthy rival, amalgam; and this leads me to speak a word of disfavor for this much lauded, much talked of abomination. I use pretty strong terms, believing it deserves it. It has been one of the destroying agents of more good teeth than any other material ever used as filling—it has marked the highway into the profession for a legion of quacks and charlatans—and at the present time is working the profession and the public an injury which years of persistent labor cannot efface. Amalgam, as first introduced, was a compound of silver and mercury, or silver, copper and mercury, subsequently tin was also combined with these; palladium, platinum, gold, and other metals, have been combined with the mercury in various proportions to suit the whim of some amalgam enthusiast and to put money in his purse.

Of the relative merits of these various compounds I have nothing to say at present, except to add that some of the metals named have an affinity for mercury and form a true amalgam; others have no such affinity and hence do not amalgamate but form a simple mixture. Let us review our history a little and see what some of our prominent writers have said in the past of amalgam. Professor Chapin A. Harris, "Harris' Dental Surgery," page 270: "Amalgam is the most pernicious material that has ever been employed for filling teeth, * * * it often hastens their destruction. Several decided cases of salivation occasioned by the use of it have fallen under my observation. * * * it matters not how pure the metals composing it may be, the amalgam is equally deleterious in its effects, for the *mercury* is the mischievous ingredient."

Professor Piggot, "Piggot's Dental Chemistry:" "So virulent a poison as this should never, except in cases of the sternest necessity,

be introduced into the system, and then it should be done with the greatest care, and so managed that its absorption may be controlled, or that the quantity to be taken in may be regulated.

"How are these conditions fulfilled when an amalgam is introduced into a tooth? Not at all.

"The use of mercurial amalgam is, under all circumstances, wrong, for the simple reason that we have no guarantee that the most frightful results of mercurial poisoning will not take place. It is a well-known fact that small portions of metallic mercury daily absorbed, produce the most distressing and unmanageable forms of mercurial poisoning."

H. S. Chase, in MISSOURI DENTAL JOURNAL: "Amalgam I am totally opposed to, on account of its constitutional effects and the only excuse for its use is the inability of the patient to pay for the more expensive materials or the incapacity of the operator." From the statements of these gentlemen founded as we may believe on their experience and observations, we can but conclude that amalgam *once*, at least, was a dangerous material to use.

Has its properties changed except for the worse; if it was dangerous to use then, is it not so now? They do not tell how these injurious effects were produced, but we are led to conclude that it was from the absorption of the mercury, set free, from the surface of the plug, by the action of the fluids in the mouth.

That mercury is capable of being absorbed by the tissues from simple contact we have abundant evidence, and that it produces death of the tissues, both hard and soft, is another well-known fact.

A case came under my observation recently which led me to conclude that mercury in an amalgam plug might be taken up in the circulatory system by other means than the saliva. A gentleman whose constitution was peculiarly susceptible to the action of mercury, had a gold crown attached by means of amalgam to the root of a bicuspid. Before placing the crown in position, the root was prepared and the apex of the canal thoroughly filled with gold; the dam was placed upon the root, and the amalgam filling was started upon the gold filling at the apex of the root. The canal was filled with amalgam, as was also the gold crown, which was then driven down upon the root and secured in its permanent position, so that the upper surface of the root was brought in direct contact with

the amalgam. In a day or two after the operation, the patient presented himself, complaining that he felt the injurious effect of the mercury.

The crown and amalgam from the root canal were removed and the canal filled with gold, which was carried up and built over the upper surface of the root, so as to completely cover it. The crown was then replaced with amalgam, and from that time no injurious effect of mercury was experienced.

Here was a case, which, when first examined, was perfectly protected by the gold crown from the action of the saliva, but still exhibited all the symptoms of injury from mercury. After the removal of the amalgam, however, from the root canal, and protecting the upper surface of the root with gold, so as to preclude the possibility of amalgam reaching the tubuli, every trace of mercurial poison disappeared.

Several other well-marked cases of the constitutional effects of mercury from amalgam plugs have since presented themselves where the mercury was excluded from the saliva.

An imaginary objection might be raised here, that the amalgam plug is inert, the mercury being in this instance combined with other metals; that pure metallic mercury is not present, and if it were it would not be poisonous. But this objection is merely an assertion and is based upon no logical deduction from fact or experience. Whether mercury is absorbed in its metallic form, or combined with some other element, as oxygen, chlorine, sulphur, iodine, or whether in its metallic state it acts as a poison, has never, I believe, been definitely determined. But that it is found in its metallic state in the bones, brain, lungs and other tissues, is a certainty.

It is evident that its constitutional effects are due to its absorption in some form, for they are identical, whether applied to the skin, or mucous membrane or injected into the veins.

If we take into consideration the histological character of the tissues of the teeth, with their tubuli filled with living matter, passing from the medullary center to the investing membrane, thus forming a complete circulatory connection with other living parts, it seems reasonable to suppose that the mercury may be as readily absorbed from direct contact with the tubuli as by any other means.

If we accept this theory, we have a key to the failure of many amalgam plugs.

In the case of children, whose teeth contain such a large amount of living matter, and where so many amalgam fillings fail, it would follow, if we carry out a principle of this theory, that the failure is due to the destruction of the unusual quantity of organic or living matter.

Likewise at the cervical wall of soft teeth where the failure of the amalgam plugs is especially noticeable, the failure would be attributable to the fact that at that point the dentine contains the maximum quantity of living matter which suffers destruction in the presence of mercury.

Considering the subject with a view to the plausibility of this theory, is it not possible that there are destructive agents at work equally as potent and as sure in their consummation of destruction, as the hypothetical "battery" that affords a refuge for manipulative imbecility?

Dr. Eames followed the reading of his paper, with some remarks, as follows:

The cervical portion of teeth is softer than the rest, and soft foil should be used there, and the softer the teeth the softer the material that should be used, and the more care should be taken. Tin is the best for very soft cases.

It is well known that mercury will devitalize tissues, both hard and soft. Writers at the present day claim that mercury does its injury in the system in the metallic form. I knew a case of a gentleman having two dead bicuspid roots, the apex of each filled with gold. Gold crowns were fastened upon them by means of amalgam. There was trouble immediately, and evidence of the effects of mercury, though the amalgam was shut up inside the crown and nowhere in contact with the soft tissues. The patient was one who is susceptible to very small portions of mercury. The crowns were cut off and reset with oxycloride of zinc, and the trouble ceased.

In another case a molar filled with amalgam gave constant trouble until re-filled with gold, when the trouble ceased. In an amalgam filling we bring mercury in direct contact with the living contents of the tubuli, and destruction is in proportion to the porosity of the teeth. Thorough condensation of the filling only increases

the amount of free mercury in contact with the walls of the cavity.

Amalgams most surely fail at cervical borders where there is the most living tissue to be destroyed. If put in a tooth with a pulp nearly exposed, it will die under it. This may be disputed, but observation will show it to be so. The denser teeth are, the less danger there is from the mercury in amalgam, and it is still less in dead teeth.

DISCUSSION.

DR. TALBOT: It has been a theory of many years standing, that caries is caused by acid conditions in the mouth. Dr. Brophy and myself have made some experiments indicating the particular acid probably active in the destruction. It is known that starch is very abundant in the food taken into the mouth. In contact with the ferment in the saliva it is rapidly converted into sugar (glucose), a molecule of which will separate of its own accord into two molecules of lactic acid, which has a special affinity for lime salts. Is it not probable, therefore, that this acid is the one most actively concerned in the destruction of the teeth?

As to the action of mercury in teeth: As we mix amalgams now, there is very little surplus mercury, or none, and I cannot see how any absorption of mercury can take place after the chemical union, or complete alloying of the metals is accomplished. The red-blood corpuscles being the $\frac{1}{2500}$ of an inch diameter, do not often enter the tubuli. It would be necessary to minutely subdivide the mercury with some substance to be absorbed through them.

DR. BROPHY: I do not believe that it is possible for mercury, fixed as it is in a good amalgam, to escape so as to be absorbed in injurious quantities. Amalgam is at first a mechanical mixture, but the hardening is caused by chemical union, or alloying, with the various metals.

DR. EAMES: I do not propose to tell *how* mercury gets from a plug into the circulation, but presume that the gentleman will not dispute the mercurialization from the amalgam in the cases described. The ptyalism occurred and was difficult to account for in any other way.

DR. TOWNSEND: I had occasion to make an amalgam filling for a lady who had once been salivated immediately after an amalgam filling was put in one of her teeth. Of course I used the greatest

possible care in making my filling, but it was followed by salivation the same as in the previous instance.

DR. BROPHY: It has been claimed that metallic mercury cannot be absorbed except in fine trituration (and therefore homœopathic preparations of mercury produce ptyalism more readily than others), and I do not see how it is *possible* for ptyalism to be produced in the way described.

DR. NEWKIRK: I would like to know what is meant by "salivation?" There are many things that will cause increased flow of saliva for a time. In mercurial salivation there is always irritation of the gums, especially at the margins. There are a very few persons who are susceptible to injury from the very minutest portion of mercury, and occasionally one is equally susceptible to some other drug, but there are probably a million amalgam fillings in the State of Illinois, the insertion of which has never been followed by ptyalism, nor the smallest symptoms of mercurial poisoning.

DR. DEAN: While I agree, in most points, with the first very valuable paper (Dr. Black's), I should differ with the positions taken by the writer in a few particulars. For instance, it seems to me, that in estimating the different degrees of the destructive force, he ignores the increase of resistance that may be found in the tooth at different periods in life.

I am in doubt as to the fitness of the new terms employed in the treatise. The force that initiates the disintegration of the tissues is the same force, as a rule, that continues the work of destruction.

I think absorption of mercury through tubuli of dentine impossible, there being no living tissues with which the mercury is in contact. These cases of very special idiosyncracy, some of which have been mentioned here, have very little weight as evidence for the establishment of any general conclusion. I once had a patient who could not eat with a metallic spoon, and could not wear a metallic plate, nor even a rubber plate if the platina pins in the teeth were exposed.

DR. SPALDING: I regard mercurial salivation as the external sign of mercurial poisoning. All drugs are poisons, to the extent that they are disturbers of the animal economy, and their curative powers are dependent upon that property. There are other things that may produce many of the same symptoms that mercury does. I do

not think we well understand the degree of minute division of drugs that is necessary for their introduction into the system. I have been surprised to find how readily permeable the tissues are to very finely divided particles, especially if they have water or some other menstruum for their conveyance. If gold, or any other substance, is so finely divided that the particles can go into the interstices between the particles of water, it will be absorbed through the tissues along with the water with great facility. What is disease? A disturbance of the function of some organ. The nervous system presides over physiological functions, therefore if an organ is sick the nerve that controls the organ is sick, and that is what must be restored to its proper work. If this restoration is to be effected or aided by means of drugs, the drugs must first come into a physical condition that will enable them to exert their influence upon the nervous system.

DR. MCKELLOPS: This question of amalgam has been prominent in all meetings ever since I first began to attend society meetings. I have seen many cases that appeared to be mercurial poisoning from amalgam plugs. Who are the men who advocate amalgam? They are the men who advocate one thing to-day and another to-morrow. I have seen very great numbers of them, but I have yet to see the first perfect plug of amalgam. What has given the American profession of dentistry its standing? It is gold, and gold alone. I think what Dr. Eames has said comes nearer the truth than anything else that has been said. It destroys the tissues with which it comes in contact.

DR. CROUSE: I don't care much which side of this question I take, but believe I will go against amalgam. We have a set of men who once occupied honorable positions in practice, and as teachers in our colleges, who have become converts to the theoretical opinion that gold is the worst of all materials with which to fill teeth, and who propose to revolutionize the practice of dentistry by the force of theoretical reasoning and what corroboration it may have received from experiments out of the mouth, though these same theoretical conclusions are in direct opposition to the life-long observation and experience of great numbers of the best men in the profession. The positions that these men occupied gave them considerable influence at first, and all over this State and Iowa, and everywhere that these

teachings have gone, a great many young men have been greatly injured by them. It is a slovenly material. You can stuff it into a big cavity in a minute or two with your thumb, and it does pretty nearly as well that way as if you take more pains with it. It is so easily managed that men who use much of it soon lose all the energy and most of the skill they ever had.

DR. NEWKIRK: The picture presented to us by Dr. Black in his essay of the different classes of caries will be something to carry away with us. I would go from one end of the State to the other to hear such a paper as that.

DR. TALBOT: I wish, with your permission, to speak of a matter somewhat aside form the subject under discussion. While in San Francisco recently, my attention was directed to a patent issued a good many years ago to Dr. Beers for a method of making artificial crowns for natural roots, which appears to me to have been the original of what has been lately introduced to us by Dr. Richmond under a patent of his own. I think the credit of the invention belongs to Dr. Beers, and they should properly be called "Beers' Crowns" instead of "Richmond Crowns." I have here a copy of Dr. Beers' patent, which any of you can examine if you wish to do so.

DR. MCKELLOPS said that he saw Dr. Beers himself in 1875, and corroborated the statement made by Dr. Talbot.

DR. EAMES: There is a crown now worn in St. Louis, that was made in 1866.

SALIVA—ITS CHARACTERISTICS IN HEALTH AND DISEASE.*

BY A. W. HARLAN, D. D. S., CHICAGO, ILL.

A thorough knowledge of the fluids of the mouth is indispensable to the dentist if his aspirations look higher than the mere inser-

*NOTE—The reader may consult for profit and verification the following works: Piggott's Dental Chemistry, Fowne's Chemistry, Watts' Chemical Essays, Binz's Elements of Therapeutics, Stocken's Dental Materia Medica, Magitot's Dental Caries, Leber and Rottenstein's Caries, etc., Weld's Pathology of the Teeth, Wagner's Pathology, Tomes' Dental Surgery, Harris' Principles and Practice, Frey's Histology, Dalton's Physiology, Green's Pathology, Wright's Monograph on Saliva, etc.

tion of artificial dentures, or of filling teeth; as they of necessity mingle with and lubricate all our ingesta, and exert an appreciable influence over digestion, and all of them may in disease, materially interfere with this physiological function. Moreover, none of the secretions of the alimentary tract have a higher claim upon the attention of the dentist, looked at from a physiological or pathological stand-point, than the saliva; as it is believed to be the fluid which, when abnormal, assists, if it does not wholly produce caries of the teeth. Mixed saliva is a colorless, slightly clouded and somewhat viscid alkaline fluid without odor or taste. When normal it floats upon and readily mingles with water, and by this test alone we may generally expect that the mouth will be found free from inflammation, for in the latter event the saliva will at once begin to sink, until in a few moments it almost wholly deposits on the bottom of the vessel. Numerous analyses of saliva have been made, and of the separate fluids composing it. Parotid saliva from man contains in 1,000 parts:

Water	983.308
Organic matter precipitable by alcohol	7.352
Substances destructible by heat, but not precipitable by alcohol or acids	4.810
Sulpho-cyanide of Potassium	0 330
Phosphate of lime	0.240
Chloride of potassium	0.900
Chloride and carbonate of sodium	3.060

Submaxillary saliva is a limpid, stringy liquid, containing two parts in 100 of organic, and three parts in 100 of inorganic substances, including sulpho-cyanide of potassium. It is not a constant secretion, but is poured out in response to substances which excite the mucous membrane of the mouth or the vicinity of *Wharton's duct.* Familiar examples of its excitability are the application of the rubber-dam to lower teeth, excavating a sensitive cavity, or the introduction into the mouth of sapid substances, etc. It is intimately connected with the phenomenon of gustation. Sublingual saliva is tenacious and transparent and when cold quite gelatinous; it can hardly be called a fluid, but more nearly resembles the secretion of the mucous glands. The two last named secretions in con-

nection with the mucous of the mouth furnish the ptyalin and mucin of mixed saliva—lastly the labial, palatal, buccal and malar glands, and membranous lining of the mouth, furnish an epithelial exudate which is true mucus and identical with that secreted by other similarly lined cavities. When the above secretions are mingled together in the mouth of a healthy man, the following materials are found in 1,000 parts:

Water	994.10
Solid constituents	5.90
Epithelium and mucus	2.13
Fat	0.70
Mucin, ptyalin and traces of alcoholic extracts	1.41
Sulpho-cyanide of potassium	0.10
Chlorides of sodiun and potassium, phosphates of the alkalies and earths and oxide of iron	2.19

Also small quantities of nitrogen, larger of oxygen, and still more of carbonic acid gas. Liebig thought that the saliva, on account of its containing so much oxygen, was intended partially for the purpose of conveying it to the stomach. The specific gravity of saliva varies from 1,002 to 1.009, the daily quantity secreted ranges from 1,200 to 1,500 grams. Saliva normally secreted in the mouth of a healthy man, when tested at the exit of the ducts, gives an alkaline reaction; at times after fasting, and excessive talking, the parotid secretion, which is constant, alone is feebly acid. Alkalinity of saliva in man and animals is diminished after coitus.

Saliva is naturally an object of interest to the dentist, for he at all times and under all circumstances has to deal with it—either to mechanically exclude it during the operation of filling a tooth, or in case he finds it deficient in quality or quantity, to correct it, for he must consider it abnormal even when it parts with its inorganic salts and permits them to be deposited on the teeth in the form of calculus. The most important of the organic substances of normal saliva are ptyalin and of mucus, mucin. Ptyalin is the ingredient which possesses the power of converting hydrated starch into sugar; it is not coagulable by heat, but is precipitable by alcohol and is slightly soluble in water. Ptyalin instantly ceases to convert starch into sugar in the presence of an acid; it has no effect on

starchy aliments that have not been boiled; it is the prime factor, in connection with mucin, of all fermentation in the mouth.

Sulpho-cyanide of potassium is the only cyanogen compound that makes its appearance physiologically in the human economy; it is an ingredient of the sublingual and submaxillary secretions only, but Dalton states that he has found it after precipitating the solid matter of parotid saliva. Hoffe-Seyler states that sulpho-cyanic acid has been found as a decomposition product of mixed saliva. The principal interest that sulpho-cyanide of potassium possesses for us is in medico-legal inquiries. The chemist searches for meconic acid to confirm suspicion in opium poisoning, but he must first assure himself that the characteristic color is not produced by the former substance, or his results will be negative. This ingredient of saliva is slightly poisonous and not always present. A simple test for it, is to add a solution of perchloride of iron, when a beautiful red color is produced. Leucin, which is sometimes found in normal saliva, is supposed to be the mutation product of glandular structures. Its existence is denied by some chemists, but it is stated by Frey to be an occasional component of saliva. In saliva, under the microscope, may be seen cast-off epithelium and gland cells with mucus and salivary corpuscles; the latter are believed to have their origin in the immediate vicinity of the tonsils, and being endowed with amœboid movement, readily mingle with the saliva. Under the influence of stimulation of the sympathetic salivary nerve filaments of the submaxillary gland, a scanty amount of viscid, cloudy, alkaline secretion is expelled, containing 1 to 2 per cent of solid matter, and very rich in mucin. Whilst irritation of the chorda-tympani branches of the nerves entering the same gland furnishes a large quantity of a non-viscid fluid and strongly alkaline in its reaction; another notable fact of the two kinds of irritation is that little colloid masses are observed as a result of the sympathetic irritation; another fact worthy of mention in this connection is that in glandular swellings the saliva is impregnated with mucilaginous and colloid matter, which must arise from the sublingual and submaxillary glands, as mucus metamorphosis is seldom, if ever, met with in the parotid glands, except as a result of external violence.

Albumen, as a constituent of saliva, may always be tested for by

heat. It is in much greater quantity when the secretion is scanty under certain circumstances the secretions of the mucous membrane of the nose and lachrymal glands mingle with the saliva and give to it various albuminous matters, yet the abundant secretion of parotidian fluid tends to keep the quantity of albumen at its usual volume; finally saliva is poured into the mouth from three pairs of glands, and numerous mucus follicles or crypts keep the membrane of the mouth and tongue moistened with an exudate which in health unites with the first named secretions to furnish a lubricant for food, which is its chief and perhaps only function until it reaches the stomach. Stepping now from the consideration of normal to abnormal secretions, it may be observed that the dentist, from the nature of his avocation, ought to be most familiar with its characteristics as such, but it is not so.

Specialists in other departments of medicine have furnished the most original and accurate observations in this field. The more one reads on the subject of abnormal secretion, the more he feels the need of fresher investigation, and more definite analyses of saliva in pathological manifestations, in spite of the fact that so much attention has already been spent upon it. It is a well-known fact that when saliva is neutral or slightly alkaline, caries of the teeth is at a standstill, and when the reverse is the case, according to the character of the reaction, decay is progressing more or less rapidly. Simple calciferous saliva of itself does no particular harm to the teeth themselves, but the later complications are not so to be characterized; in addition to covering a portion of the teeth with calculus, it may give rise to ranula and catarrhal inflammations of the gums, which latter disease, if allowed to care for itself, permits tartar to be deposited even on the apex of the root of a tooth, causing neuralgia; but, before the latter complication, the whole secretion is changed by becoming profuse in quantity and excessively alkaline in its reaction, denoting disturbance of nervous equilibrium.

Saliva presents the same reaction during the course of putrid fever and purpura hemorrhagica. Pending the formation of an alveolar abscess up to the climax of pain, the saliva is abundant and the reaction alkaline or neutral; but afterward it becomes acid until the subsidence of the swelling when it once more becomes normal in quantity and quality. While in general the saliva may

give an acid reaction as a result of inflammation of the gums, we do not look to it, but to the hyper-secretion of mucus as the cause of such reaction. The acute diseases causing hyper-secretion of mucus are acute stomatitis, amygdalitis, bronchitis, pneumonia, pharyngitis, pleurisy, acute enteritis; and those of a chronic nature are marsh fever, dyspepsia, gastralgia, dysentery, etc. The mucus secreted is not of itself so much to be feared in these affections, but by increasing the flow of saliva by the use of remedial agents, there is a larger amount of ptyalin present, which, in conjunction with the *mucus*, furnishes an active ferment, producing from azotized substances as secondary reactions, butyric, valeric, benzoic, and other acids destructive to the teeth. In simple gastric disorders saliva is generally acid, which may be accounted for by increased tissue metamorphosis, the epithelium of the glandules being cast off so rapidly that a chemical change takes place in the cells, causing the secretion to appear acid.

Saliva is always scanty in fever. Thirst and suppressed secretion is a sure indication of fever in connection with heat, and is usually dependent on buccal and pharyngeal catarrh, and changes in the gastric mucus membrane. The tongue, which is dry during high fever, obstinately refuses to become moist until the temperature decreases or intestinal hemorrhage sets in, when, in spite of vascular depletion it becomes moist and remains so until increase of fever causes it to become dry again. Saliva is very copious, frothy and alkaline in apoplexy, hysteria and hydrophobia. The anomalies and abnormalites of oral secretion are numberless and instructive, but impossible to catalogue in a paper of this character. We can find parasites in it nearly always, as the thrush fungus in infancy, and in the wasting diseases—as tuberculosis, also micrococcus dentalis in whooping cough, leptothrix buccalis, vibrios and bacteria constantly. The latter stimulate the nitrogenous remains of food to putrefactive fermentation, yielding lactic acid from sugar, etc. This acid is present in saliva in gout, rheumatism, intermittent fever, diabetes and gastro-enteritis; acetic acid in scrofula, smallpox, scorbutus, aphæ and miliary fever; hydrochloric acid from immoderate use of animal flesh, including salt meats, and galvanic action, and in the early stages of inflammation of the oral mucus membrane there is an increase of the soluble chlorides which, under

favorable conditions decompose, liberating the chlorine, which unites with the hydrogen present, to form the above acid. Saliva is fetid in cancrum oris and syphilitic ulcerations, and is usually acid in reaction in catarrhal inflammations and cutaneous diseases, and venereal affections; the gums in the latter are always softened and spongy, unless mercury has been exhibited. In mercurial salivation and iodism as much as two per cent of inorganic matter with a large quantity of coagulable material have been excreted, the latter readily decomposing when lodged betwen the teeth and presenting an acid reaction. Uric acid has been found in saliva and occasionally urea.

In diabetes there is atrophy of the glandular organs of the mouth, throat and gums, saliva, strongly acid, and the oral membrane most likely to be the seat of scorbutus. Zenker found in a severe case of encephalitis that the mucus membrane of the tongue and throat was covered with oidium albicans. Space is wanting to further enumerate the characteristics of abnormal saliva. Ammonia and sulphuretted hydrogen are nearly always present in unclean mouths. Test for the latter: add acetate of lead and there will be a black precipitate. Pregnancy, a purely physiological function, giving rise to repeated vomiting and capricious appetite, disturbs the buccal fluids to such a degree that a rapid decay of teeth is observed as a sequence. It is not to be wondered at that caries of the teeth should be so prevalent when it is remembered that no disturbance of the human system prevails for even a *short* period without changing the character of the oral secretions. The various acids, organic and inorganic, coming in contact with the teeth as aliments or remedial agents, or as the result of fermentation—which latter is favored in proportion as the saliva is scanty and the mucus abundant—renders it necessary for the dentist of to-day and his future successor to be a student of chemistry and hygiene, a preserver and a master of the laws of health.

DISCUSSION.

DR. DEAN: I have listened with pleasure to this very *orthodox* paper. I differ from its statements at only one point. I understood the essayist to assert that acid saliva will not effect the change of starch to sugar, which normal saliva accomplishes, to some ex-

tent at least. Some authorities (Lehmann and another) claim that the change of starch into sugar is effected alike by an acid and an alkaline saliva.

DR. HARLAN: That is true, but the *preponderance* of authorities appears to be as stated in the essay.

DR. SPALDING: The glandular system is a very wonderful one. There are numerous glands, and each withdraws from the blood just what is required for some specific use. Every gland is endowed with a particular function, and that function consists of its power to withdraw certain elements from the blood, and from these to elaborate a specific secretion, designed for a specific purpose. This function it discharges so long as its action is normal and undisturbed. It is capable of doing nothing else while it remains healthy. When the character of the secretion is changed, and especially when its chemical reaction is reversed, I should look for a diseased condition of the gland. Certainly its state must be abnormal. In the mouth we have salivary glands and mucus glands. Distinction should be made between pure saliva as secreted by salivary glands and the mixed saliva (saliva and mucus), as found in the mouth. Pure saliva can only be got from the parotid gland. In the case of all the others, mucus is secreted along the walls of the ducts, so that it is more or less mixed with mucus before it enters the mouth.

I am accustomed to regard pure saliva as being always alkaline, and mucus always acid. If one or the other is in excess, the mixed saliva shows a corresponding reaction. Irritations or inflammations of the mucus membrane greatly increase the secretion of mucus, making the mixed saliva in the mouth acid. Healthy mixed saliva is usually neutral or slightly alkaline.

These are some of the general principles in respect to this subject, as I have been accustomed to think of it.

DR. BLACK: I do not like to discuss the paper, not having been present in time to hear the whole of it. The general subject is one of great importance. In the text-books and periodicals it has been gone over pretty thoroughly, and gone over pretty loosely, and made a general mess of. We find there is great variation in these fluids—both saliva and mucus. The mucus *may* be alkaline, and saliva, direct from the duct of steno, *may* be acid. I have found them so too many times to be mistaken.

I am well satisfied that in time the saliva and mucus will come under therapeutical control, and then we shall have made a great stride in the prophylactic treatment of caries. I had one case—a little girl—in which I had full control, being both physician and dentist. The father and mother had both lost their teeth early. At the time for shedding them, the crowns of the temporary teeth were all gone. Everywhere in the mouth, and in the duct of steno, too, there was an acid reaction. The child's parents said that Dr. Allport, of Chicago, had expressed the opinion that it would prove impossible to retain teeth in the mouth. She has been so fortunate thus far as not to loose any permanent teeth, and she has but six fillings. I would like to detail the treatment, but will not take the time, since I did so at Rock Island. Similar treatment has often failed in other cases. This should be a point to be worked toward. I am not aware of any persistent efforts by any great number, to control these conditions. It is a very hopeful field. The treatment must be therapeutic, and I am satisfied that it is within the range of possibility.

DR. SPALDING: I will suggest that the subject be parcelled out among a number of the members of the society, each taking a particular part, and so making a concerted effort at systematic investigation. I shall be glad to be one of the number.

DR. KULP: Investigations concerning the fluids of the mouth have been favorite ones with me. I have done something in that way for ten or twelve years.

They were first begun in connection with Dr. Chase, mainly in the hope of finding out what might be done to counteract morbid conditions. I have found results in respect to acid and alkaline conditions, as Dr. Black has stated them. Have found the saliva from the duct of steno acid at one time and alkaline at another, in the same person. Dentists should give their patients something to counteract acid conditions. I recommend them to use soap as a dentifrice, or one containing soap and oil of sassafras. This last is excellent for stimulating the circulation in the gums. I did not succeed in obtaining the effects that I desired by means of constitutional treatment, and became discouraged. The dentifrice referred to neutralizes injurious influences.

DR. CUSHING: I was much pleased to hear Dr. Spalding offer to take part in a series of experiments in regard to the fluids of the

mouth. I made some observations some years ago, the results of which were published. I accept Dr. Spalding's proposition and will be one of the number to undertake the investigations referred to. The paper said that healthy saliva should be neutral or slightly alkaline, as found mixed with mucus in the mouth, but where shall we find healthy saliva? Few persons are in such perfect health as to afford a certain standard of health. My experiments showed that we may find acid saliva in apparently healthy persons, and alkaline saliva in persons equally healthy. I have found saliva from the duct of steno acid at the moment of exit, while the surrounding territory was neutral. An excellent method of making examinations, that can be made with litmus paper, is to go to some public institution where the conditions of diet and habits are similar.

DR. KULP: There is an Orphan's Home in Davenport which has been partly the field of my observations. In my private practice I often found about as much difference in the same mouth at different times, as I did in different mouths.

DR. BLACK: Was the time of making the observations taken into account?

DR. KULP: I usually went before meals.

DR. BLACK: Mixed saliva is often acid before meals and alkaline after, the difference being probably caused by the increased flow of pure saliva.

DR. SPALDING: We are accustomed to think of secretions as being uniform in character, but many of them are not easily examined. We do know that the saliva varies in character at different times, and it is important to determine whether the variations are natural or morbid. Some observers have examined the saliva of horses. In the country they found it always alkaline. In the city, after a while it became just as variable as in man, and was often acid.

DR. SWAIN: I wish to be one of the investigators suggested by Dr. Spalding. I made some observations of that sort some time ago, extending through considerable part of a year, and taking into account the considerations mentioned by Dr. Black in regard to the time before or after meals, etc.

DR. BROPHY: I wish to be one of these observers also, and hope that sometime we may know how to use remedies for the cure of diseased oral secretions.

A PLEA FOR DENTISTRY.

BY R. J. PEARSON, KANSAS CITY, MO.

[Read before the Kansas State Dental Association.]

Mr. President and Gentlemen: Ever since the American people have gained for themselves a distinctive nationality such as entitle them to manners and customs peculiarly their own, they have been noted for their mania for hobbies and for riding the same at a "John Gilpin" speed. Every one in America, be he great or small, is disposed to have a hobby, and he that has none soon loses his identity as an ideal representative of American peculiarities. As with individuals so it is with the trades, professions and other callings, and American dentistry is no exception; it, too, has been afflicted (if affliction it can be called) with innumerable hobbies, all of which in their time have been duly tested in the crucible of practical experiment; and while many have been found wanting and rejected, others have been retained and continue to do good service. Hard and soft foil, hand and mallet pressure, the new departure, etc., have each had their turn on the "tread mill" until they have become "old, old songs."

It is true that many, if not all, of these hobbies have their origin among the leaders of the profession, men of acknowledged ability and high scientific attainments, while the masses, the hard-workers in the busy hive of professional life follow blindly in their wake, shouting "Eureka!" at the top of their voices, without so much as a passing thought as to what the result will be. Of course there are exceptions to this rule, but like "angel's visits, they are few and far between." Among the many subjects at the present time exercising the "mind dental," the one that attracts most the attention of many of our leading men is that of education—and well it should, too, for as public schools are said to be the bulwark of American liberty, so must the education of its members be the bulwark of the dental profession. We know of no more worthy subject to occupy the minds and exercise the energies of our representatives than the thorough, systematic and practical education of our young men, so that in the future they may keep pace with the developments of the age, and thus give to dentistry a more exalted position in the world of science.

A great many other subjects seem, from present indications, to be endangered by individual hobbies, at least in one direction, viz: "That of wholly obliterating dentistry as a distinct science and merging it into medical science as one of its specialties, thus doing away with all such titles as "Doctor of Dental Surgery," etc., and marshaling it under the banner of "Doctor of Medicine." To such a proceeding we enter our earnest protest, not because we do not have for the medical profession the most profound respect and esteem, nor because we are opposed to a full and complete knowledge of medical science or any other educational attainments that have a tendency to expand and cultivate the professional mind, and thereby elevate the science of dentistry and increase its usefulness, but because we are proud of dentistry, as it stands to-day an independent, self-sustaining science; proud of it for what it has accomplished in the past, through years of vicissitude and patient toil, and for what it is capable of in the future. Dentistry is to-day without a parallel in the progress it has made in rendering subservient to its purposes the arts, mechanics, and other sciences by means of which it has risen *unaided* amid the taunts, jeers and discountenance of the medical profession, from a position of almost absolute insignificance to a rank second to no other professional avocation. It can boast of men in its ranks who in point of intellectual capacity and scientific accomplishments, have few peers and no superiors in any department of life, and to dentistry must they return thanks for their success.

My friends, the medical profession has repeatedly snubbed you; it has again and again refused to admit you upon an equality to its ranks. It does not want you unless you are willing to "come under the rod" and take a subordinate position. To go to the foot and spell up as it were, according to its dictations. Then why take a backward step at this late day, why bow down and kiss the hand that smites you with oppression, in order that you may receive gracious recognition from a haughty and unnatural mother who once drove you from the household, leaving you to the mercies of a cruel world to work out the problem of your own salvation, which be it said to your undying glory, you have done with great credit. To be a dentist should be honor enough; we can well afford to be proud of a title that graces a "Tomes," a "Taft," a "Chandler," a

"Flagg," an "Atkinson" and many other great and good men. Then let us cease this everlasting knocking at the door of the medical profession, for by so doing we but humiliate ourselves in their sight. Let us be dentists in all that the word implies.

Then, I repeat, let us encourage our societies, encourage our colleges, encourage the dissemination of medical as well as every other science that pertains to our calling and tends to increase its usefulness to the world; but not, however, to the end that we may be recognized as an insignificant branch of the medical profession, for that would be an act not only unworthy of ourselves, but would be an insult to the brave, generous, self-sacrificing men who placed us where we are. Rather let us strive for *dentistry*. Strive to retain for it the position it has already so nobly won. Strive to elevate it still higher upon the tower of fame. Build for it an everlasting monument upon its own merits. "Let us do well our part for there all the honor lies." "Let us be faithful to our trusts," so that in the end when the roll of the great is called and the curtain on the stage of history is raised and the grand tableaux of the sciences shall be enacted, and astronomy shall expose to the gaze of an admiring world its bright stars in the person of a Herschel and Proctor; electricity its Morse and Edison; chemistry its Faraday and Leibig; medicine and surgery its Gross, Pancoast, Flint and Da Casta; dentistry, too, will be there written in letters of purest gold, studded with the rarest gems, shedding lustre bright as a noonday sun upon the names of a Harris, a Westcott, a Wells, a Varney, a McQuillen, a Cutler and myriads of others, who having fought the good fight are now *sleeping the sleep that knows no awakening*.

JOURNALISTIC.

In the "British Journal of Dental Science," for February, we find a lengthy account of an attempt to organize a dental society for the "midland and northwestern counties." It is interesting as showing the feeling of the average native dentist against American dentists who happen to be practicing there, and also against American degrees.

It seems that a motion to the effect that "the following gentlemen be constituted the council to draft by-laws, nominate officers," etc., had been offered, and that in the course of the discussion which followed, the name of Mr. F. A. Huet, of Manchester, was suggested as a member of the council. The chairman, instead of putting the name to vote, called attention to a letter from Mr. Huet in which he said he "had given so much time to the question of dental reform that he felt he must now devote the whole of his energies to the requirements of his profession."

It was remarked, however, by "H. Coleman, D. D. S." (American degree, mind you), that "The name having been once put, I think, should be voted upon." Whereupon a "Mr. Stewart" jumped up and blurted out: "You are not entitled to say anything. You are not a qualified dental practitioner." Other parts of the proceedings were off the same piece. The editorial in the same number ran as follows: "Referring now again to the new Midland Counties Association, we shall forbear from making any comment upon the proceedings, leaving that for our readers to do if they see fit." And again: "We cannot refrain from expressing our regret that such a matter should have been allowed to pass unchecked at a meeting of which one of the chief conveners (D A. Wormald, D. D. S. ?) himself, holds an American dental degree; and we must add that the quiet forbearance of the gentleman, who was not allowed to speak, reflected honor on the American diploma he holds."

The March number introduces "Our English Correspondent" in this fashion: "We reprint, etc., * * * as we think it is just as well that we should sometimes see ourselves—as Burns says, though in his northern dialect—as others see us."

"Extracting teeth and putting them back into the jaw" is credited in the July number to the "Lancet." It reads as follows:

"We invite opinions—of course from qualified surgeons who are engaged in the practice of dentistry—on the subject of tooth extraction and replacement. Under what conditions is it possible to extract the stump of a broken tooth, affix a new crown to it, or otherwise manipulate the structure, perhaps under antiseptic precautions, and to return it to its socket? Of course the nerve connection must in any such case be destroyed. The question is, we take

it, one of vitality in the periosteum of the tooth. Can this be kept alive, say for half an hour; and when the stump is returned will union take place—we mean such union as shall render the replaced tooth practically again part of the organism? Or, is it simply from this time a foreign substance, which may be tolerated for a considerable period, but will perhaps suddenly become the seat of irritative processes, and need to be removed? If members of our profession—with whom alone we can discuss a question of surgery and physiology—will favor us with concise statements of their opinions, on this interesting subject, we shall be glad."

In answer to some critical comments by Mr. Henry Lewell, M. R. C. S., the editor of the "Lancet" makes this reply:

"We hold strongly that 'dentistry' is an integral part of surgery. We claim the right of every medical practitioner to pursue dental surgery if he pleases, without any additional qualification, and we cannot recognize the right or competency of any man who is not a 'medical man' to discuss a question in connection with the surgery of the mouth, which involves issues so especially medical as that of transplanting teeth."

All of which is exceedingly funny. The editor "invites opinions," but not of those who are best qualified to hold opinions, and whose personal observations qualify them to "speak by the card." He wants—must have—opinions only from certain persons. It matters little if their notions are based on knowledge. They may assume much, talk loud, appear very learned, and yet *know* nothing of the matter, so that they are members of "our profession"—medical men practicing *at* dentistry. The "Lancet" says in effect: "We don't want knowledge, but opinions, and these must come from a certain source. It is not the fact that we call for, but the fact as (mis-?) understood by a class—the class to which we belong."

We volunteer the following: "Of course the nerve connection must in any case be destroyed." Certainly it must if "nerve" is taken as the equivalent of *pulp*. And what of it. Nerve connection of this kind is destroyed every day by disease, by medication and by the application of mechanical means, and the tooth retains its place and usefulness for years This is an every day fact with which even an office boy is familiar If the "nerve connection" of the peridental membrane is meant, it is as certainly *not* destroyed, the proof of

which may be arrived at by analogy and by the application of an excavating instrument to the pulp-chamber of a re-planted tooth. "Can this (the periosteum) be kept alive, say for half an hour?" Yea, verily, and for forty-eight hours in some cases. "And when the stump is returned will union take place?" Yea, again, and many are the re-planted teeth that have gone into the ground with their owner and as a substantial part of him. Teeth, and lots of them, too, have been extracted and returned to their places in the jaw; extracted and set into sockets formerly occupied by other teeth; extracted and made to grow in a cock's comb; and finally (to the shame of the man who did it), freshly extracted teeth have found a permanent abiding place in the tip of a dog's tail. From what has been done one is almost persuaded that teeth can be made to grow anywhere.

If the editor of the "Lancet" really desires to *know* something of this matter, he can undoubtedly be easily accommodated by any live *dentist* (not medical man practicing dentistry) in or about London.

Our readers will remember that in the June number of this journal we criticised somewhat freely, and yet not unjustly, "A Letter of Importance," etc., as published in "The Practitioner." In its issue for July "The Practitioner" served us up as follows:

"CRITICISM.—Not knowing 'L.' of the MISSOURI DENTAL JOURNAL, we presume that he is 'L(ord) of all he surveys,' minus the titles D. D. S. and M. D. We are willing to award to him the degree of 'A. S. S.' to which he alludes.

We are sorry that *he* is unable to *see*, 'what use?' We are happy to inform him that gentlemen of acknowledged ability have expressed the great need of such a reference work as we propose to make of 'The Dental Directory of the World,' which lies beyond the perception of his critical optics. From 'L'(ord's) remarks, one would conclude that he was without the five dollars which would entitle him to a place among the *heavy letter* gentlemen. If such is the case we will most cheerfully print his name in that type, gratis; and also give him credit for his 'snap' in the MISSOURI DENTAL JOURNAL with whatever titles he may furnish us; but let us turn from 'this picture' to what is said by Prof. J. Taft, who is *high authority* in dental matters."

Then follows Prof. Taft's opinion which has been read by all who take the "Dental Register." The Professor's words are commendatory, and justly so; and yet, in spite of such high commendation, there are features that are objectionable, or that "lie beyond the perceptions of his (our) critical optics." We need not repeat them.

Now, as to our titles. We may or may not possess them. None to a dozen will cover all we can lay claim to, and (will he believe it), "A. S. S." is not among them. "We are sorry," etc. (The reader is assured that this quotation has no connection with the latter part of the foregoing sentence.) Very likely, but being "sorry" does not tell us "what use?" We put the question again: "Of what possible consequence," etc. (See MISSOURI DENTAL JOURNAL for June.) The directory part is all right—something to be desired—and the sooner it is issued the sooner will the publisher deserve (and receive) the thanks of the profession.

As to our being without the necessary lucre, perhaps "B. M. W." is right. While five dollars may be of little account down his way, its loss makes an awful hole in the pocket of the poor cuss doomed to practice in "these yer parts."

The conditional proposition to "print his (our) name in that type, gratis," is not yet accepted. We will keep it in mind and perhaps take advantage of it sometime in the future.

Another word and we have done: "L" is also to be given "credit for his 'snap.'" Now "snap" catches us. Does he mean to be understood in the sense of *snap judgment*, or *snap ruling*; or does he refer to the "snap" of the critical whip; or (we say it in all modesty) does he wish to be understood in the sense of "soft-snap," a word frequently used "a many years ago" when "sporting on the green?" The world looks on and awaits his answer.

MISCELLANY.

SCENTED CREMATORY URNS.—An interesting archæological observation has recently been made quite accidentally. It was well known that the urns found in Roman burial grounds, and containing the bone remains of cremated bodies, are often covered with clay-cups or dishes. The object of these dishes was supposed

to have been to contain spices, which sent forth agreeable odors during the process of the cremation. Herr Dahlem, a well known German archæologist, was able to verify this view in the following manner: He had obtained a dish of this kind which was broken, and, after cementing it, had placed it upon a stove for the purpose of drying the cement. Shortly afterwards he noticed a strong and by no means unpleasant odor proceeding from the heated dish. It seems, therefore, that the ingredients burned in the dish some fifteen centuries ago had left traces behind, which announced their presence upon being heated. Herr Dahlem remarks that the odor was not unlike that of storax.—[*The Nation.*

PAPER LEATHER.—The "Paper World" describes a new kind of paper sizing which promises to be exceedingly useful. It is considerably cheaper than ordinary size, and it has the merit of making the paper waterproof without discoloration. In one experiment one hundred and eighty-five pounds of leather board were manufactured from hemp, which was made nearly fine in the engine, and then the new sizing added, mixed, precipitated and beaten fine. The thin endless sheets were woven around a cold cylinder, and when of sufficient thickness, cut, removed and dried in the sun. Strips one-fourth of an inch thick, when dry and before rolling, were as pliant as most sole leather, and could be bent square over without cracking. This leather board can be made insoluble in either hot or cold water. A piece of it not perfected, and not wholly impervious to water, one-fourth of an inch wide, cut lengthwise of the fiber, held up seventy-seven pounds stone. By rendering the same board insoluble, the strength was increased from seventy-seven to two hundred and eleven pounds. Leather paper of less thickness, made in the same manner, is described as pliable, somewhat elastic, apparently durable, and suitable for the uppers of shoes.—[*Scientific American.*

THE influence of gas-light upon the eyes has been made the subject of investigation by educational authorities of Germany. A full report appears in the "Polytechnische Notizblatt," from which

we extract the following: "In general no injurious effects were observed from gas-light upon the eyes of pupils when so arranged that the eyes were protected from the direct flare of the lights. For this purpose shades or globes should be employed. Dark, opaque, metallic shades are, however, very injurious, and a large proportion of the complaints concerning gas-light were tracea le to their use. By their use the eye is kept altogether in the dark, but exposed to the reflection from a very brightly lighted surface. Glass globes of a milky tint are far more preferable, as they transmit and diffuse the light without proving at all irritable to the eye. A gas burner sets free a considerable quantity of heat. The light should therefore not be so close to the pupil's head as to produce cerebral congestion. If several persons read or study by the same light, it should be reflected from above through a glass plate of this milky hue. If there be a peculiarly morbid irritability of the eyes, dark blue chimneys may also be employed. With such precautions no fear need be entertained of any ill effect from gas-light.—[*Allgemeine Wiener Med. Zeitung*, No. 41, 1879.

SOUTHWESTERN DENTAL SOCIETY.

In response to an invitation circular, sent to the dentists of Southwestern Missouri and Southern Kansas, a meeting was held at the office of Dr. J. W. White, Carthage, Mo., August 17th, which resulted in the formation of a society under the above name. A constitution and by-laws were adopted and the following officers elected:

President, Dr. E. Hovey, Buffalo, Mo.; First Vice-President, Dr. J. O. Haux, Columbus, Kas.; Second Vice-President, Dr. J. T. Lindsey, Carthage, Mo.; Secretary, Dr. G. A. Keyes, Girard, Kas.; Treasurer, Dr. C. F. Wright, Springfield, Mo.

EXECUTIVE COMMITTEE.

Drs. J. M. White, Carthage, Mo.; L. L. McLeskey, Neosho, Kas., and G. A. Keyes, Girard, Kas.

BOARD OF CENSORS.

Drs. E. Hovey, Buffalo, Mo., C. F. Wright, Springfield, Mo., and R. I. Pearson, Kansas City, Mo.

After a very interesting session of two days, adjourned to meet at Columbus, Kas., on the second Tuesday in August, 1881.

E. A. KEYES, Secretary.

EMPORIA, KANSAS, May 26, 1880.

The ninth annual meeting of the Kansas State Dental Association was held at Emporia, Kansas, on the first Tuesday in May, 1880. The following officers were elected for the ensuing year:

President, Dr. W. H. Shulz, Atchison, Kas.; First Vice-President, Dr. A. H. Thompson, Topeka, Kas.; Second Vice-President, Dr. S. P. Huntington, Eureka, Kas.; Secretary, Dr. J. A. Young, Emporia, Kas.; Treasurer, Dr. J. D. Patterson, Lawrence, Kas.; Delegate to American Dental Association, Dr. A. H. Thompson, Topeka, Kas.

Adjourned to meet at Topeka, Kas., on the first Tuesday in May, 1881.

DR. J. A. YOUNG,
Secretary.

EDITORIAL.

THE NEW YORK MEETING.

The meeting held in the city of New York for the purpose of organizing a National Dental Association, resulted in the formation of a society called "The Dental Association of the United States of America."

A constitution was adopted, one provision of which divides the United States into five districts. Meetings are to take place annually, and are to be held in the several districts successively, except that every fourth year the annual meeting is to be in the city of Washington. The sections into which the Association is divided are to report only at these quadrennial meetings, which are also to be international. The intervening meetings to be held in the dis-

tricts, are to be devoted chiefly to the reading and discussion of papers. Each of the five districts has a vice-president, all of whom must reside in their respective districts.

The provisions for members are as follows:

"The future membership of this Association shall be composed of dentists who may be elected upon application, which application shall be accompanied by credentials of membership in a State society, or by a recommendation from five members of this Association or of his State society.

"No person commencing the practice of dentistry after this date shall be eligible to membership unless he shall have received a diploma from some reputable dental college."

The plan upon which the Association is organized contains many excellent features. It is more elaborate than that of any of its predecessors; time and experience with its workings will determine if it is too much so.

The old "Southern Association" goes back to its former name and status. The "American Dental Convention" which we supposed was to be merged into the new organization, still maintains a separate existence. The outcome of the meeting is, that instead of uniting existing societies into a single organization, an additional one has been formed, so that we now have quite as many associations claiming a national character as we had before. This result will certainly disappoint the expectations of many who were hopeful of a different result and must tend to weaken the force of the new organization.

A PROCESS FOR SHORTENING CHLOROFORM NARCOSIS.—Professor Schirmer uses a sheet of writing paper rolled up like a "lighter," and dipped in liquor amm. caust., for stimulating the Schneiderian membrane, to arouse the patient.

He does not claim that the danger of chloroform narcosis can be prevented by this proceeding. Simply that taking advantage of the persistent sensibility of the mucous membrane of the nose, the patient can be aroused by irritating this while other parts are still insensible.—W. W. S. in *Central-blatt fur Augenheilkd*, February, 1880.

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A Monthly Record of Dental Science and Art.

VOL. XII.—OCTOBER, 1880.—NO. 10.

ON THE COMPARATIVE VALUE OF SULPHURIC ACID AND CREASOTE IN THE TREATMENT OF ALVEOLAR CARIES.

By J. N. FARRAR, M. D., D. D. S.

Read before the Anatomical and Surgical Society of Brooklyn, N. Y., May 17, 1880.

Mr. President, Ladies and Gentlemen:

Thanking you for the courtesy shown in the invitation to address you this evening, I wish to first say that it is not my purpose to advocate any new remedy nor to enter into a discussion of the histological causes of disease, nor to attempt explanation of the laws governing the intricate chemical reaction of medicines, but simply to give my views of some of the principal agents in use, and, approximately, their relative value in the treatment of alveolar diseases. I shall also try to show why certain remedies are better adapted for the treatment of some cases, and why it is that, though best for one class of conditions, they may be contraindicated in others; that while sometimes the antiseptic treatment (which is one of the principal ones in vogue) is of special value, the acid treatment (which is another method) is of equal value under different conditions.

It does not follow that because a diseased tissue may be sometimes, or even generally, successfully treated by a certain method, that such method is necessarily the most scientific. The wonderful recuperative power of nature is manifested by the response made to even slight endeavors to assist her. Medical treatment and its successes often flourish in the borrowed costume of mother nature.

Although the territory of my subject is small, the conditions of alveolar diseases and the treatments indicated, are so various that their exhaustion would be too lengthy for such an occasion as this. Therefore I shall only incidentally refer to the management of acute forms of alveolar diseases, which call for more varied forms of medicines, and direct the main portion of my remarks to the treatment of chronic cases, including not only caries but alveolar abscesses proper, as alveolar caries is sometimes the result of abscess and often found associated, more or less.

Although there are frequently, if not generally associated, remnants of former cists, I think we seldom, if ever, find a perfect abscess-sac accompanying necrosis. From a carefully kept record I find that in my practice there are about nine cases of simple abscess, without necrosis, to one complicated with it. If this approximates an average rate, it is important to determine upon a method which shall be suitable as a general treatment.

If, owing to the inaccessible location of the necrosed part, it is impracticable to remove it by small instruments, the application of acid, in proper strength, from time to time, is thought to be beneficial in hastening a cure. The drugs upon which I rely for general use, more especially in chronic cases, are sulphuric acid, sulphate of zinc, chloride of zinc, iodine, chloride of sodium and creasote. All of these are useful in various degrees of dilution. I shall principally confine my remarks this evening to the use of sulphuric acid and creasote, and as before hinted, and only incidentally allude to the others, not, however, because they are not of equal value, or even superior in acute cases, but because I wish to show the opposite and comparative value of creasote and sulphuric acid, and show when and where they are indicated.

Different varieties of creasote have different practical values. When or by whom creasote was first used in the treatment of such diseases I am not able to say, but as to sulphuric acid, as well as

nitric acid, we find, according to Dr. Lawrence Heister, who wrote largely in the German language in A. D., 1718 (one hundred and sixty-two years ago), that it was then in use in the treatment of necrotic conditions of jaw bone. Since that time it has been more or less advocated, but with somewhat more interest after the report of Dr. Pollock's experiments in 1868-9, published in the "London Lancet."

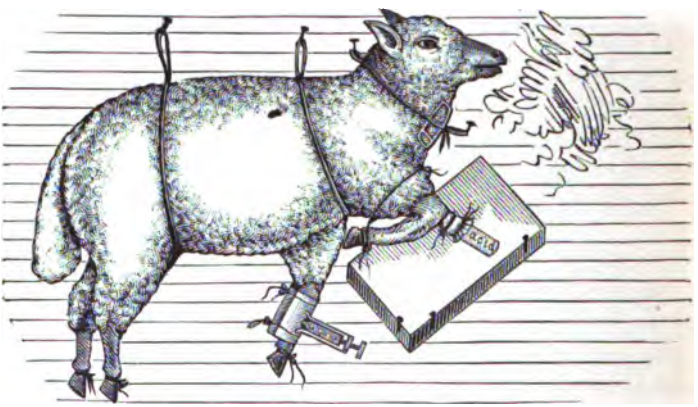
For several years past, and until of late, the use of sulphuric acid, more especially in the form of elixir of vitriol, has been especially advocated by a few members of the dental profession as the treatment *par excellence*, not only for necrosis but for alveolar abscess. The hypothesis set forth as positive theory by these gentlemen being that "acid would vigorously act to remove all the dead bone present without acting upon the surrounding living bone." If this be true, it would sure enough seem to be the acme of scientific triumph.

There is no greater power of influence for swaying the multitude than strong assertions from enthusiastic people, and we cannot but admire such enthusiasm when based upon convictions; but experience teaches that "all is not gold that glitters," nor is all enthusiasm, truth.

After this beautiful little story had been promulgated and entertained by many people for several years, and to demonstratively prove to my own satisfaction the real degree of virtue of "aromatic sulphuric acid," I made, in 1866–7, a long series of experiments with not only this form of acid preparation, but various degrees of aqueous solutions of all sorts of sulphuric acid, the commercial (always impure,*) the Nordhausen, and the absolutely pure, ordinary acid (prepared especially for my use). These experiments numbered about 200 and were made with great care, consuming almost all of my spare hours, day and night, for over a year, and were not only made upon all conditions and forms of lifeless bone, but included vivisection experiments, the results of which showed that aromatic sulphuric acid, *per se*, has little or no effect for disintegrating bone of *any* sort, and that while dead bone, long enough subjected to aqueous solutions, will be affected by them, they act with equal vigor upon living bone, thus proving beyond

*Sulphate of potassa, sulphate of lead, hyponitric acid and chlorine, are the usual impurities found even in the best commercial acids.

doubt that however plausible, and however desirable the hypothesis set forth, it had but very little scientific foundation and it is no wonder that this information created surprise at seeing the "bottom drop out" of the beautiful hypothesis, at the time, I recited before a large body of professional gentlemen in New York City, in 1877, the results of my labors.



The appearance of a sheep undergoing a vivisection experiment, by Dr. Farrar, to ascertain the effects of sulphuric acid on living bone. Drawn on the spot. See article in "Dental Cosmos," Oct. 1, 1878.

The "funeral" was exciting, and as the chief exponents of the hypothesis were present, the "wake" was interesting in the extreme. Although nothing has since been heard of the "old story," the acid treatment has survived, though in less activity, but its application seems to be based upon different reasons.

Owing to the number and length of these investigations and the lack of time necessary to clearly set them forth, and as many of these experiments are published in the (July, August, September and October, 1878, issues of the) "Dental Cosmos," I shall not dwell upon them now, but basing my arguments upon those experiments with more recent results, and the experience before and since in practice, will continue to reiterate my views, then expressed, though, perhaps, in a more pronounced degree.

Sulphuric acid is highly recommended by some persons for uni-

versal use in all conditions of abscess, but while it will frequently lead to fair results, and while it is undoubtedly to be preferred to creasote in cases of necrosis, I do not think its indiscriminate use in the treatment of simple abscesses, even though it be slightly antiseptic, is in accordance with highest scientific principles.

While in cases complicated by necrosis the acid treatment in some form may appear to be indicated, in simple abscesses, where there is no dead calcific matter, except perhaps the apex of the root, it is not; for we do not expect nor desire to remove it unless ragged, when, if accessible, it may be best to attempt to round it off, but if not, it is important to preserve it from further degeneration. Any drug that will do this and at the same time cure the abscess and surrounding tissue, has a two-fold value.

Creasote has this to a high degree, while acid, so far as its action on the dead portion of the root is concerned has not.

Creasote has all the desired properties of sulphuric acid which are indicated in the treatment of simple abscesses, with far superior antiseptic qualities, and as alveolar abscesses are not, as a rule, accompanied by necrosis proper, the former would seem to be superior for general use.

Even in the cases where acid is indicated, the final dressings, after the dead bone has been removed, may profitably be made with "wood creasote" in order to secure its great antiseptic virtue, for the dead root is ultimately to be clothed like an encysted foreign body by the encroachment of the alveolar walls or the intermediate softer tissues, which either contract around it, or by granulation or otherwise thicken so as to embrace it. This is one of my special points in contradistinction to the theory of destroying and eradicating the sac.

Two varieties of creasote should be considered: Escharotic and non-escharotic. Wood creasote is practically non-escharotic, and while this form may be superior for some cases where it is not desirous to destroy tissue, I think it is not equal to the other form in early stages of treatment when destruction of the interior surface of the sac is indicated.

While creasote preparations are thus highly recommended for general abscess treatment, it is of the utmost importance that a correct diagnosis be made. Should there be even slight necrosis

present, the solution of the dead bone, so important to a final cure, will for the time be apt to be arrested by the use of creasote. I have known cases to be only apparently cured by this mistake, the disintegrative process and pus formation for a time being arrested, the fistula closed, producing what may be termed a "false cure," which remained only so long as the effect of the creasote prevented further decomposition of the dead tissue.

It is sometimes a nice point to determine whether there be necrosis present or not, when very limited in extent and difficult of access, but skilled examination will generally reveal, by means of a delicate probe, the difference between living and dead bone.

Should there be, however, a doubt in the diagnosis, with strong suspicion of necrosis, it would appear to be a proper rule to give such cases the "benefit of the doubt," and treat with acid, the form and strength depending upon circumstances.

Having briefly considered the comparative virtues of these two kinds of creasote, let us now confine our attention more especially to the acid aspect of our subject. Sulphuric acid, of which there are two varieties, the ordinary (H_2, SO_4), and the Nordhausen (H_2, SO_4, SO_3) in its proper state, has not, to my knowledge, been employed in practice, but the "aromatic" form, known as "elixir of vitirol," has been in general use, as before stated. But in order to obtain a more vigorous action, various degrees of dilution of pure acid has been thought to be more efficient in stubborn cases, where dead bone is associated. There are, however, some considerations respecting the acid treatment, which in my opinion are of importance.

Different and perhaps exaggerated views are entertained in regard to the relative value of the ordinary and the Nordhausen forms. This, however, only applies to the difference in degree of strength.*

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* COMMERCIAL AND ORDINARY SULPHURIC ACID, U. S. P.

The molecular weight of $H^2 SO^4$ is 98.

The atomic weight of H is	1	thus	H^2	X 1 = 2
" " " " S "	32	"	S	X 32 = 32
" " " " O."	16	"	O^4	X 16 = 64
Equals molecular weight of sulphuric acid				98

When Nordhausen acid is added to water in the proportion of 178 (by weight) of acid to 18 of water (by weight), it is converted instantly into commercial sulphuric acid, but is of purer quality, thus: $\underset{178}{H_2\,SO_4\,SO_3} \times \underset{18}{H_2\,O} = \underset{196}{2H_2\,SO_4}$. Therefore, for aqueous solutions of this degree of strength there is no difference between the two acids, and both may be used under the above modifications in aqueous solutions, but in alcoholic (aromatic) solutions the Nordhausen is stronger and acts more injuriously to destroy soft tissues.

Chemical experiments upon dead tissue outside of the living organism, as illustrative of similar conditions in the living, are always open to criticism, though often absurd, especially so in the direction of physiological chemistry.

The chemical action of acids even upon dead bone in and among living tissue has been and is, by some people, now supposed to be somewhat different from their action upon outside dead matter.

How much and in what way so-called "vitality" influences the action of chemical agents is not well known. I will not attempt to discuss the question. Many of these physiological queries are sometimes satisfactorily answered, but only on the basis of hypothesis. It is my belief that the difference in conditions of experiment is not so much a difference of kind of chemical action as a difference in degree.

We have dead and dying ossific tissue and wish to prevent further extension of death, and get rid of the dead portion. What shall be done? Is there any drug that will, when applied locally, hasten decomposition of the dead bone and at the same time stimulate diseased living tissues to a healthy action? Can any acid be made to dissolve it—so to speak—or not, and if so, will it dissolve the dead bone without acting similarly upon the living bone? And if so, can it

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NORDHAUSEN SULPHURIC ACID.

The molecular weight or $H^2\,SO^4\,SO^3$ is 178.

H^2 X 1 =	2
S X 32 =	32
O^4 X 16 =	64
S X 32 =	32
O^3 X 16 =	48
Molecular weight.....	178

be used in sufficient strength without injury to the surrounding soft tissues, and if so, to what degree and what preparations are best for practical use? Some of these questions I have already partially answered? Of course in my remarks it should always be borne in mind that systemic treatment, such as food and sunlight, have their influences in the formation of the "line of demarkation," as well as that of judicious general medical treatment.

Experiments show that necrosed bone *per se* may be acted upon (other things being equal) as well *within the jaw as without*, but in actual practice "other things" cannot be made equal; therefore, allowances must be made, and great allowances too. So far as the action of acids upon dead bone *per se* is concerned, we have the matter in a nutshell.

Experiments show as hinted that necrosed bone can be dissolved by the use of some solutions of acids, but these experiments have led me to conclusions somewhat at variance with those generally entertained, especially in regard to the degree of medical value of the different forms of sulphuric acid. The unavoidable, surrounding conditions in actual practice necessarily retard, if not interfere with, the action of chemical agents applied from without, even if an effort to retain them in place by the Hiester method by tents of lint or cotton be made.

A sequestrum placed in a bottle containing an abundance of (aqueous) acid solution, although not at first, will after two or four hours begin to show decided chemical action upon it; but in practice if we apply the same drug in the treatment of necrosis the quantity must necessarily be very limited and also weak. The presence of pus detritus in and around the necrosed parts and the natural secretions of the same will so soon dilute and drive out this small quantity as to materially reduce the degree of chemical action.

These hinderances added to the lack of time required to obtain full action of the acid in actual practice, would lead us to infer that if the soft tissues would tolerate it, a stronger solution would be necessary to accomplish the same degree of chemical action which a larger quantity of a weaker solution would do in the laboratory.

Deferring for the present the alcoholic solutions, such as the aromatic sulphuric acid, which have little or no practical disintegrative chemical power *per se* upon dead bone, *per se*, a solution

of about four parts of water to one of acid will not act upon necrosed tissue in the living jaw more than, if, indeed, as much as a solution of about nine parts of water to one of acid on similar bone outside of the body, if kept at the temperature of the blood. Therefore, it would be natural to infer that to obtain best results the local application of acid in practice should be frequent. But the action of pure acid being very destructive to living tissue, we are obliged to use weaker forms in practice. But a strength of dilution that will not destroy living tissue is so weak that under the difficulties mentioned, it will not have so much disintegrative effect upon necrosed bone as at first might be supposed, unless the necrotic portion is sufficiently exposed to apply the acid directly upon it, without coming in contact with living tissue, a condition of circumstances which probably would be better treated with a steel excavator.

Yet there is no doubt that the frequent and long continued use of some forms of solutions of acid will hasten somewhat the decomposition of dead bone, leading to an earlier cure; but whether this decomposition is from direct chemical action on the bone, *per se*, or through the increased activity of the vital process carried on by nature, is the question.

If we apply any of these solutions, even the aromatic sulphuric acid, to a case in practice where the necrotic portion can be observed, slight effervescence is noticed to take place for a short time. The relative proportion between the two forms of lime in bone is 57.35 of phosphate of lime to 3.85 of carbonate of lime, in 100 parts. Now, in the natural decomposition of necrosed bone, the secretions are constantly holding in solution more or less of this lime, and the carbonate coming in contact with sulphuric acid unites and causes slight effervescence, but this does not extend much beyond the time necessary to make this change in the lime solution in the pus detritus. This phenomenon is what has led some people into the error that it was demonstrative proof that the acid acts vigorously upon the bone *per se*.

Proof additional that the bone is not vigorously acted upon lies in the fact that if we subject a piece of necrosed bone, in the laboratory, to pure aromatic sulphuric acid for three days and three nights, at 100° of temperature, we will find after reweighing, that it has lost

nothing.* And while such bone similarly treated with aqueous solutions of sulphuric acid will in the end be destroyed, the action is so slow at first that the change can only be seen after one or two hours.

If this be so, it will readily be seen that with all the hindrances mentioned in actual practice, we cannot depend much upon its direct chemical action upon the bone *per se*; and upon close observation it will be found that the chief benefit from the acid treatment lies in the stimulation and assistance of mother nature in her efforts to establish the line of demarkation, and the formation and granulations behind the sequestrum, leaving the dead bone in a condition to be more easily removed by instruments; and in cases where the sequestrum cannot be reached, will not prevent its natural decomposition, as would be the case if impregnated with creasote.

As to the comparative value of the aqueous solutions with the "elixir of vitrol," circumstances must decide.

While in most ordinary cases, the aqueous solutions that will not destroy surrounding soft tissues must be so weak that there probably is but little, if any, practical difference when the bone is accessible so that solutions may be used without coming in contact with living tissues; stronger ones, even to the strength of one of acid to four of water, may sometimes be better, but as before said, the action of acid upon bone is so slow that the more experience I have, the less faith I have in it as a disintegrator of necrosed bone in actual practice, with a growing faith that its virtue lies almost entirely in assisting nature in detachment of the sequestrum by stimulating activity along the "line of demarkation."

PROCEEDINGS OF DENTAL SOCIETIES.

ABSTRACT OF A PAPER READ BEFORE THE NEW JERSEY STATE DENTAL SOCIETY, JULY 22, 1880.

BY DR. C. A. STOCKTON, OF NEWARK.

[Reported for the MISSOURI DENTAL JOURNAL.]

The practice of dentistry is, like marriage, not to be entered into unadvisedly, but reverently, discreetly. There is criminality attaching to incompetency. The higher we go up in the scale of profes-

*For explanation of this see the "Cosmos" Vol. XX, Sept. 1878, p. 490.

sional practice the more solemn becomes our duty to be capable. All duty indeed ought to be performed conscientiously, yet if the iron puddler spoil his mould it is no great loss; if the barber mangle your hair it will repair itself, but if the physician, through culpable stupidity, slays while pretending to save, it becomes a crime; and so it is with the dentist who inflicts useless suffering, or mars his patient, or leaves a memorial to curse him in snags and roots of bitterness. The young minister's attention is repeatedly directed to the gravity of his work by the question whether he is "called" to it, and there is a sense in which all of us should so consider our vocation. Our modern pulpit orators give us no longer the divisions of their sermons, and one is often puzzled to discover any underlying law in the chaos; there is no skeleton to their mental protoplasm. As in history we study by epochs and afterward fill in the intervening gaps, as the painter sketches his picture before applying the color, so let us see from a kind of Mount Pisgah what land lies before us.

Our aim should be to discover the best methods of doing quickly and painlessly what has been such a slow torture. As the medical profession has found its way from blistering, bleeding, the heroic bolus and preposterous potion, to the truth that the mild power cures, so our aim must be the invention of schemes which leave no injury and inflict the minimum of pain. Pain exhausts the system and constitutes a heavy draft upon the vital powers, therefore the more it can be avoided the greater the amount of health and strength preserved.

It is for us to study our work upon a tooth with as much forethought and carefulness as the diamond cutter displays in fixing upon and polishing the faces and angels of a Victoria Regia or Great Mogul. We should determine the best methods of combining strength with beauty. And while we study the various arts and methods whereby to cover nerves and still their throbbing, or embalm the decaying organ, or fill its exterior with the precious metals—while we seek medications and the most efficacious processes for arresting dental decay and death, let us learn to reverence our work. If it is a decent occupation to "gar auld clo's leuk a' maist as weel as new," how sublime that work which shall restore to primal health and usefulness one of the creator's gifts to man. And

the house we live in can be materially reconstructed—our eyes fitted with spectacles, our ears with trumpets, and our teeth with fillings and crowns, which serve the same purposes as the original parts. In our advance, or rather retrogression to mechanical dentistry we learn how to replace the wreck which rottenness and death have made; we prepare the mouth for the substitutes for its late occupants, and place these partial or complete dentures that are almost the counterpart of nature. Said Kepler, when studying out the laws of the heavenly bodies, "I think thy thoughts, O God;" and we, though in humbler spheres, pattern after the great Modeler. In many cases, perhaps, art may improve nature—as where there existed some defect or malformation. Some men have such miserable teeth that the poorest artificial ones would serve them better, and the same fact will hold with reference to the brains of others. This opens up the great debate as to the respective claims of nature and art to excellence; but it appears in our practice as elsewhere, that art is but the unfolding of nature, the carrying to an ideal perfection the hints which lie latent in the original. To find the best methods of manufacturing teeth which shall be counterfeit presentments of nature's best; light, strong, durable, and allowing perfect mastication and articulation. Compared with that, what is the restoration of a painting, or the rebuilding of a palace? These deal with lifeless stones and pigments, but we with living organisms.

The decaying teeth give us our first disagreeable impression of our mortality; it is the first stage of that crumbling away which by and by shall attack irresistibly the whole frame and level it with the dust, and thankful are we to him who can put away these unwelcome suggestions, postponing them indefinitely to our thought. And if there be any superlative merit in the creation of any part of the human body by the first artificer, he who interferes to prevent its destruction must share in the glory. Physicians and surgeons are co-laborers with God in the human frame, He conceiving and erecting, they preserving against untimely ruin and repairing the broken places, and they not only save organs, but alleviate pain. To give a quietus to acute suffering, to act the part of saviours to society in this respect, has something divine in it.

While constantly called upon to face the extremest forms of anguish, the surgeon must control his own lacerated sympathies and

have every faculty at the command of a cool intelligence, yet he may profitably study the mystery of pain, the purpose of its introduction, the end of its existence.

We sometimes affect to disparage the pain which proceeds from an inferior part; we do not respect the protest of a tooth nerve as much as a twinge at the heart strings; but all pain is referable to the brain, and though it may not be serious it makes the haughty soul attend. And the resources of pain seem largely to predominate over those of pleasure; pain has ten avenues to pleasure's one, and pleasure is evanescent while pain is lingering. Lives are shortened by the endurance of excessive pain, and to-day it is not so much work as rack that breaks down constitutions. It is the wear and tear and exasperation of nerves which kills. The patriarchs lived their hundreds of years because they simply vegetated. A man at 80 now, is a condensed Methuselah. Well for science if she follows out what she has so well begun in later years in the prolongation of human life by the banishment of pain. Already the average duration of life in the race seems on the increase, and the over-sanguine look forward with hope to the recovery of our pristine longevity.

Picture to your fancy a toothless specimen of the genus homo, with sunken and expressionless lips, all the lines of beauty obliterated and the language of Shakespeare and Macauley degenerated into an indistinct mumble, he becomes a mocking death's head, a very genius of famine. What would be the Venus de Medici or a Beatrice de Cenci without the warm, sensuous curves of the lips? The mouth more than any fictitious cranial bumbs is the proper index of the brain behind it. And even the power of the tongue depends on the presence of the teeth. Where would be the eloquence of Demosthenes without his incisors! But this is not the worst. Moroseness sets in when the teeth get out, and the happiest wit becomes a confirmed puritan. "Where be their gibes now, their songs, their flashes of merriment that were wont to set the table in a roar? Not one now to mock their own grinning! Quite chopfallen!"

Bad teeth, with the attendant imperfect mastication and consequent dyspepsia, give rise to all hopeless views of life and man's destiny. Hope flags, faith departs, the gods forsake the sky, and kind Providence is replaced by a melancholy and misshapen chance; thought and feeling die, the tides of life ebb to the lowest, the most fatalistic

and atheistic views in philosophy are adopted readily, the whole universe seems bound by irrefragable chains of suffering and remorse, the stars shine with a yellowish glare to his gangrened vision, and a settled misanthropy possesses him, and taunts him with the unanswerable interrogatory: "Is life worth living?"

Consider how all this mournful record might have been reversed by a proper attention to our art. While happiness may not be the end of life, nor the test of virtue, yet the pursuit of it is noble and engrosses all, and oftener than elsewhere it may be chased down and captured in a dentist's chair. Here beauty is regained, character brought back, the esteem of the public repurchased, hope restored, the throne of the Deity unveiled, the world clothed in beauty, and the silver lining of the cloud turned outward; pessimism is pushed out by a rejoicing optimism, which believeth all things, hopeth all things. A tooth root may thus become a root of all evil, and its extraction may operate like the eradication of original sin.

The Dental profession has not, perhaps, had the credit due them as creators of English literature, but Milton could never have written paradise lost, nor Tennyson composed the reflective in memoriam, nor Gladstone and Stanley made parliament and Westminster ring with eloquence, had they not first well masticated and digested good English beef, requiring jaws in good repair under the solicitous surveillance of a dentist.

It comes also within our plans to discuss the questions belonging to dental pathology; the application of special medication to special ailments, whether the difficulty arise from constitutional or from local causes, and the proper treatment in each particular instance, for diseases like individuals have a personality of their own. It is the invariable mark of the empiric to have a stereotype prescription for a malady when general appearances are the same.

And here we have to notice that grandest discovery in modern healing, the use of anæsthetics. This great boon has given the world a fore-taste of that time when there shall be no more sickness, neither shall there be any more pain, for the former things have passed away. While the most critical operations are being performed men may have the visions of the lotus eaters,

"With half shut eyes ever to seem
Falling asleep in a half dream."

Feeling there is no joy but calm, and whispering, "surely slumber is more sweet than toil." How much of the unspeakable horror of war is mitigated by this discovery, and the primal curse upon mother Eve in mercy assuaged. Instead of writhing in agony under the knife, to float upon a calm and shoreless sea, oppressed only with a delicious sense of our own infinitude and extacy, while busy phantasy conjures us with gorgeous dreams. "To sleep, and by a sleep to say we end the heart-ache and the thousand natural shocks that flesh is heir to; 'tis a consummation devoutly to be wished," and the wished for boon is found. What King Lemuel says of wine is true of the ethers and chloroforms and nitrous oxides: "Let him drink and forget his poverty, and remember his misery no more." The man is as unconscious that his tooth is gone, as is the victim of the clever oriental executioner; until the latter obligingly gives him a pinch of snuff, and the head tumbles off with the sneeze.

And we must not pass by the correction of dental irregularities, whereby a mouth that is as overcrowded as a frontier hostelry—with three in a bed and the floor stratified with slumbering humanity—is rendered commodious and presentable; a mouth that we could imagine to belong to some unconscious poet, one of those "mute, inglorious Milton's," filled with heavenly visions, but having no gift of language, and that his ponderous thought created an earthquake in his mouth in the endeavor to find expression. It is given us to work with the human face divine, bringing out latent improvements and investing it with unforeseen beauties; we are artists surpassing in our material and effects the productions of a Raphael or a West, for our matter is living flesh and our product an animate beauty.

We should know something of the principles of chemistry, especially in relation to materia medica; we should examine with all the ardor of the wise old alchemists, falsely deemed mad, the pharmacopœa of nature, for earth is the nurse of man and she possesses for every sickness or wound the vix-medicatrix. The panacea for every ill sought by the ancient alchemists does not exist in any one potion, but does exist in nature as a whole, and we should have an ever increasing desire to know the materials of nature and their purposes and properties for the repair of our frames.

We should also know something of physiology and learn "what a piece of work is man." It is as an animal we will have to view him, yet it is a noble study. Only recently have the sciences of physiology, histology, and embryology been written. Men confused themselves for ages over insoluble problems of will and destiny, and held a knowledge of their corporeal existence in contempt.

We should know something of the processes of digestion and the laws of hygiene. These modern times are insisting rightly, more and more, upon the necessity of properly cooked food. The laws of diet, cleanliness, and the general preservation of the health must be reiterated strenuously, so that a blockade against disease may be enforced. It is the evil of a high civilization that men sin constantly against their stomachs, and think themselves pious, when a little of the healthful barbarism of the savage would be beneficial. Each man has branded in him Scotland's imperial motto: *nemo impune lacesset* —no man insults me with impunity.

Some knowledge of general anatomy is necessary, notwithstanding the objection that our profession is but a speciality. A too contracted specialism belittles the mind. The man who knows only his own speciality does not know that thoroughly. Dentists must be something more than respectable jaw-carpenters.

Liberal education is valuable for its own sake for the pleasure it adds to life, and it is an introduction to the society of the cultivated, thereby securing a more refined and better paying patronage. It is more valuable than any other form of advertising.

But the most classical education is of little worth without the formation of good habits. One may be ever so skilfull, yet if he is not affable and gentlemanly, cleanly in dress and person, and refined in language, no gentleman or gentlewoman will employ him. Little things determine our success, just as a pebble on the Rocky Mountains may deflect one stream to the Atlantic and another to the Pacific. Choose a high ideal and maintain it.

DISCUSSION.

DR. ATKINSON: Anæsthesia is death in the ratio of its manifestation. That is the text I would offer as the basis of all intelligent remarks upon any paper eulogizing the greatest iniquity that has ever been promulgated in scientific medical literature. I regard the very reverse of the statements made in the paper as the truth respecting

it. And, as a rule, science first comes to us wrong end foremost; that is, our first outlook represents to us the obverse of the truth at every step in science, and we are to-day in our sciences most wonderfully and lamentably crippled by reason of these imperfect presentments of scientific application through the whole system of medical and scientific literature.

Exaltation of feeling is in certain manifestations regarded as desirable, and those persons who are accustomed to live under more or less of it, of some sort, are never satisfied without they are literally drunk. Now we have the reverse of that in carrying it beyond the bounds of endurance; when it becomes destructive we call it pain, and to get rid of that we will do anything. And the folly that I have observed long and seriously and sadly is the assumption of knowledge on the part of everybody in the sick room where a patient is in distress, to be able to suggest something that will cure him instanter and should be tried. We want to get beyond that; we want to understand the organization sufficiently to comprehend what function is, before we assume to distinguish between normal and abnormal function, between healthy and diseased manifestation. That a person should, except in extreme cases, resort to an anæsthetic seems the off-shoot of the barest, blindest ignorance. In a very few instances where death is imminent, an anæsthetic may be used. I have used it. I was the first man who attempted to make chloroform in the United States of America, and I know what I am talking about in this matter of a sense of the responsibility that rests upon the man who interferes with the functions of the human body. I have practiced obstetrics, and if the use of an anæsthetic is excusable in any case, I think it is in those extreme cases of labor on the part of women who should never have been permitted to be impregnated, who are unfit to become mothers at all.

There is a want of discrimination between what we know and what we fancy is true. We want a cannon of criticism applied to our mental processes, whereby we may test the value of what we think ourselves, so that we may separate what shall instruct from that which only pleases the imagination. You should study the timber you work on. As the chemist studies the elements he finds in various combinations, so the surgeon should study the tissues with which he has to deal. It is the demand to have disagreeable things done in a state of obliviousness, so that the pain shall not be

felt that has laid the foundation for all that flashy talk about the beneficence of anæsthetics. It is the too free use of those anæsthetics that is destroying the grey matter of the brain in this generation, so that we shall not have fathers and mothers who will strike off buds that shall be worthy of the high state of life in the elysium portrayed. I would as soon think of going to hell to establish heaven as of going to anæsthesia to establish the health of the human body. Who ever witnessed an operation under the influence of an anæsthetic that was decently done? Who can make an operation without the coincidence of his patient that is worthy to be called an operation at all? It might be excusable if an operation were to be performed upon an infant or an idiot to put them into an unconscious state, because they cannot coincide with you in any case. I say to my patients.: You and I are doing this work and if you will coincide with me we will get good results; we will go up the hill of difficulty step by step, and as we remove one obstruction we will see how to take the next step properly. I believe that 99 per cent of the pain in surgical operations is imaginative, is the product of false teaching and the imagination. It is necessary first to get control of the confidence of the patient in order to make the operation with the best results. Many of my brethren stand by and see an operation made without the use of an anæsthetic and shudder at its supposed severity, and when I am through with the operation the patient looks up with a smile and says: "Is that all?" And I will show you ten, twenty, a hundred cases of that kind right along consecutively. If you cannot control the confidence of your patient by your honesty and intelligence, and the magnetic influence of your personality and human affection, for God's sake don't call on old Sam for his first lieutenant, anæsthesia, to subdue the patient for you.

ANÆSTHETICS.

BY G. CARLTON BROWN, D. D. S.

Read before the New Jersey State Dental Society, July, 23, 1880.

[Reported for the MISSOURI DENTAL JOURNAL.]

The year 1844 is the generally accepted time when artificial anæsthetics was discovered, but we can trace it much further back than

this. In the year 160, A. D., one Lucius Appuletus wrote on the subject, and said that by taking mandragora wine, a sleep would be produced, during which an operation might be performed without pain to the patient. This is, probably, the first mention of the subject. In the year 1298 Theodoric gave instruction for preparing a sponge, inhaling from which would produce insensibility. Sir Humphrey Davy in the year 1800 made use of this expression: "that nitrous oxide appeais capable of destroying physical pain and may be used with advantage during surgical operations." Drunkenness by alcohol was also used about this time. But none the less honor is due to our own countrymen and fellow dentist, Dr. Horace Wells, who, on the 12 of September, 1844, took nitrous oxide gas, had a tooth extracted and felt no pain; and through him the great discovery, to which he was a martyr, received its first impulse. At first the world was skeptical, but as soon as it had once been proven that by the use of certain drugs immunity from pain would be produced, the knowledge of it spread rapidly, for such a boon had never before been granted the human race. The amphitheatre of a hospital 40 years ago, compared with the same to-day, would hardly seem to be the same place. At that time were seen patients struggling in the hands of the surgeon and his assistants, often causing operations to be failures, perhaps bringing about their own death. How different it is now. But let us proceed to examine the different anæsthetics employed, and, if possible, discover which is the safest, and, therefore, the proper one to administer.

CHLOROFORM.

Guthrie, in New York, Soubiran, in France, and Liebig, in Germany, each independently discovered this substance at about the same time, 1831. It is without doubt the most pleasant to inhale, as well as the easiest to administer, of all the anæsthetics, but its administration, except in extreme cases, is by some considered criminal. Unlike ether, it kills at any stage, and without a sign to warn. In the case of Miss Wilson, who died under the influence of chloroform after the extraction of ten teeth, in February, 1878, the verdict of the coroner's jury was, that "the woman died from asphyxia caused by the use of chloroform," and they condemned the use of chloroform in dental operations. We do not wonder that dentists

who are not always familiar with the number of fatal cases from the use of chloroform, employ it, when they see it recommended by some of the most distinguished surgeons of the land. These latter are the culpable ones, for they know its fatal character.

In giving an anæsthetic, the operation, if slight, is often performed before complete anæsthesia is produced. In relation to this, especially as regards chloroform, Brunton, in the "British Medical Journal," says:

"The cause of death during the extraction of a tooth under chloroform was probably the stoppage of the heart's action through the inhibitory fibres of the vagus, associated with a reflex depression of tone in the blood vessels. The reason why the extraction of a tooth in a person who is not under the influence of an anæsthetic is followed by no ill effects is probably this, that in him the irritation of the fifth nerve produces two distinct actions which counterbalance each other. It may cause reflex stoppage of the heart through the vagus, but at the same time it causes reflex contraction of the vessels through the vasomotor center. This contraction of the vessels maintains the pressure in the arterial system during the stoppage of the heart, and thus no harm whatever is done. When, however, an anæsthetic is used, one of these pieces of nervous mechanism may be paralyzed by it, while the other is not, and thus the extraction of the tooth may stop the heart without causing contraction of the vessels. The blood-pressure will then sink very rapidly in the arterial system, and fatal syncope may be produced. If, however, the anæsthetic be pushed to a greater extent, so that both parts of the nervous mechanism just mentioned are paralyzed, the vessels are not contracted, neither is the heart stopped. The operation is, therefore, comparatively free from danger when no anæsthetic has been given, or when the anæsthesia is perfectly complete, the period of danger being that of imperfect anæsthesia."

ETHER.

Dr. Morton was the first to use ether as an anæsthetic in performing surgical operations, Oct. 16, 1846. When administered, the first part affected is the cerebrum, and after this the anterior centres, while the functions of the medulla oblongata are duly performed. This is the time to remove the drug, for, if continued, the

medulla oblongata is affected, and death occurs from paralysis of the respiratory centres. From this we see that the great danger to be guarded against is over-inebriation, and to guard against this, necessarily requires experience and a thorough understanding of the symptoms.

Anæsthesia by ether is divided into three stages: The first stage is that of exhilaration, which opens a large field for examination. It is held by some that while in this condition the patient shows his natural disposition, and by others that it goes by contraries. The second stage is that of stupor or complete insensibility, and it is in this stage that operations should be performed. By judicious administration of ether, the patient may be kept in this stage almost any length of time. But if care is not exercised the third stage is produced, the symptom of which is stertorous breathing, which, if the drug is persisted in, will be followed by coma and death.

These stages are what are ordinarily experienced in the administration of ether, and when they are well marked, there is comparatively little danger; but there are certain cases in which the patient may pass into the second, or even the third stage, without a sign, and it is with these that the great danger lies.

There is another class in which it seems impossible to bring the patient under the influence, even by the most persevering efforts. In these cases, if they are very grave, some authorities recommend chloroform.

BROMIDE OF ETHYL, OR HYDROBROMIC ETHER.

This is a colorless, transparent liquid, with a strong ethereal odor, but somewhat sweeter and more like chloroform than ether; it seems to combine the properties of the two. Dr. Turnbull, in his last work (1879), claims that he was the first to experiment with it on man, but he is in error, as Mr. Nunnelly, of England, used it on his patients in 1865; having been experimenting with it on the lower animals for some fifteen years previously. The rapidity with which it acts is wonderful. In one experiment I put a cat fully under the influence in thirty seconds, and in twenty seconds from the time I removed the drug the cat was running around the floor. I have taken it myself, and find the effects to be very pleasant; the recovery is very rapid, you seem to wake as from sleep, with no unpleas-

ant sensations, such as headache or nausea. Since its safety has been questioned, numerous experiments have been made on the lower animals, with not as favorable results as could be wished. Its action on the circulation is found to be very much the same as that of chloroform, the depressing effects being fully as great. The local application to the exposed heart of an animal, stops its action immediately, as does chloroform.

NITROUS OXIDE.

This substance should be studied more carefully than the others, as it is more used. Authorities differ regarding it, therefore it should not be trusted too implicitly, as has been the practice for a few years, dentists persuading patients to take it, who were willing to undergo the operation without it. I know of one case in which it was thus forced on a young lady, by which severe temporary, if not permanent trouble, was produced. Dr. Turnbull, in his last work, mentioned a case in which a rabbit was kept under the influence an hour, alternating the gas with atmospheric air. The longest time he mentioned keeping an animal alive in the gas alone, is thirty minutes, the subject being a frog. He cites these experiments in favor of the gas, yet strange to say, Prof. H. C. Wood uses the same experiments as an argument against its use. Speaking of its physiological action, he says: "It is well established that the gas is not capable of yielding its oxygen so as to support life. A taper will burn in it, it is true, but its decomposition is due to the high heat; and at the temperature of the body the compound is a stable one. M. Jolyet and T. Blanche have found that seeds will not germinate in it, and that animals (frogs, sparrows, guinea-pigs, rabbits, etc.) live no longer in an atmosphere of pure nitrous oxyde than in one of pure nitrogen, Even Dr. Colton, who maintains the absurdity that nitrous oxide produces hyperoxygenation of the blood, states that in an atmosphere of the gas, a mouse will live only from thirty to sixty seconds, a pigeon one to two minutes, a kitten one to two minutes, a frog thirty to sixty minutes—all dying of asphyxia."

He also, after carefully reviewing the subject, makes this assertion: "It would seem that this accumulated evidence is sufficient to show that the anæsthesia produced by the inhalation of nitrous oxide is simply asphyxia, and that its administration is simply a neat

way of stopping the supply of oxygen, and thereby inducing asphyxia."

Nitrogen when taken does not act so readily or pleasantly as nitrous oxide, but in the *post-mortem* the lungs are found to be in the same condition, being marked by the spots which are peculiar to death by suffocation, and distinguishing it from the asphyxia of drowning and strangulation.

As yet chemistry has not shown that nitrous oxide is decomposed in the blood, so that the oxygen can fulfil its office; in fact it is pretty well proven that it cannot be decomposed, and that the nitrous oxide takes the place of the oxygen, but is thrown off in the same proportions as it was taken in. But that some action takes place is evident from the darkness of the mucous surfaces that have been noticed. Carbonic acid produces this effect, but I have been unable to find an explanation for it, in the use of nitrous oxide.

Probably the most thorough investigation of this subject has been made by Drs. Jolyet and Blanche, published in the "Archives de Physologie," July, 1879. They arrive at the following conclusions:

"We are compelled to say that chemically pure protroxide of nitrogen cannot support respiration in animals or plants; that it is not able to sustain respiration in animals any more than in plants, the combustion in which respiration consists not being sufficiently energetic to decompose the nitrous oxide gas. Breathed pure by animals the protroxide of nitrogen is an asphyxiating gas, which produces death with all the signs of asphyxia by strangulation, or by respiration of the inert gases, nitrogen and oxygen, and in almost the same time. Breathed pure, if the nitrous oxide produces anæsthesia, it is by privation of oxygen from the blood, insensibility showing itself when the arterial blood commences to have only from two to three per cent of oxygen. The arterial blood is then very black, and contains thirty to forty per cent of protoxide of nitrogen. Animals are able to live by breathing an atmosphere of protoxide of nitrogen and oxygen in the proportion of the gases in the air, the nitrous oxide replacing the nitrogen without producing troubles of sensibility; the arterial blood then contains thirty to thirty-five per cent of protoxide of nitrogen. Birds plunged into a similar confined atmosphere behave like those placed under a bell-jar of the

same capacity containing air, and die after having nearly equally consumed the oxygen in the receivers and formed as much carbonic acid. The protoxide of nitrogen being an irrespirable gas, and possessing none of the anæsthetic properties that have been attributed to it, its employment can only be dangerous, and should be under that title proscribed from medical practice."

From this evidence I think we can but conclude that nitrous oxide is an agent that the less we have to do with, the better.

Experiments are now being made by which a mixture of equal parts of nitrous oxide and air, under pressure of two atmospheres, is breathed, the intention being to give the patient the normal quantity of air as well as the required dose of the gas.

While there is such great uncertainty about the subject of nitrous oxide, are we justifiable in administering it, since where an anæsthetic is necessary, we have such a safe one as ether?

DISCUSSION.

DR. J. A. OSMUN: The paper is an admirable one. I was talking recently with a surgeon in charge of one of the New York hospitals, in reference to chloroform, and he made this observation, which I afterwards found reported in one of the medical journals: "That in proportion to the gravity of the pain to be undergone, chloroform lost its dangerous elements; that the more the pain, the less the danger;" and he attributed the many deaths that occur from the administration of chloroform to the small amount of pain to be undergone. He mentioned child-birth as a class of cases that need a strong anæsthetic. Dr. Simpson, an authority on the subject of chloroform, says that no other anæsthetic will relax the muscles of the uterus like chloroform.

As to the safety of nitrous oxide, it must be a safe agent, as the percentage of deaths is very small, and it is so extensively administered to all sorts of people, and by those who know nothing whatever of the condition of their patients as to organic disease. But I believe it has been the curse of dentistry, because many people who would otherwise have had their teeth put in order and saved, have had them extracted because it could be done painlessly, and so have lost their natural teeth.

DR. J. C. HANKS: I look upon nitrous oxide as the safest anæs-

thetic when given pure and with care. But my objection to giving it is, that there are people walking about all over the world who are just ready to die of some disease; we read day after day of these people dropping dead in their seats, and it is very possible that we may meet them in our offices and give them the nitrous oxide, and if they should die under the influence of it we should be blamed, just the same as if there was nothing the matter with them when they came to us. The public is not a very discriminating body, and we are held responsible for what happens in our offices whether we are at fault or not. Diseases are sometimes very obscure and we run great chances of killing somebody who is just ready to die of disease.

DR. J. HAYHURST: During the first fifteen or twenty years of my practice I administered ether as often, sometimes, as five or six times a day, always carefully examining the patient for disease of the heart. For some five or six years back, instead of holding the patient under the influence of it until a long operation was performed, as I formerly did, I have not permitted it to continue for any great length of time; I extract two or three teeth, let the patient recover a little, and again administer it and complete the operation, or extract two or three as before. Since I have administered ether in this way I never have the slightest difficulty, and generally avoid all nausea to the patient afterwards. I regard ether as the safest anæsthetic I can use. In some cases the patient cannot be brought under the control of it, and it seems to me that either ether is losing its power, or the people are becoming more unsusceptible to it.

I have a notion that nitrous oxide initiates incipient death, that is, it causes a stoppage or asphyxia of the vital forces, therefore, from a physiological point of view, ether would be considered the safest agent, but, as has been remarked, nitrous oxide has been given to thousands of people, in most cases without the least examination of the patient, and it is a remarkable fact that so few deaths have occurred when you consider what kind of people have taken it and who has administered it. That fact would seem to prove it to be the safest, while physiologically considered it would appear that it is not as safe as either ether or chloroform.

The position taken in relation to the comparative danger of chloroform, that the greater the pain the less the danger, is probably a

correct one; but I take it that the severer operations develop a will-power, something like that which Dr. Tanner manifests in resisting hunger, and that it is the greater will-power that averts the danger. I can see no connection between pain and tenacity of life under chloroform.

DR. OSMUN: The shock of the pain restores the normal condition.

DR. C. S. STOCKTON: In the paper that I read before you yesterday, I spoke very highly of anæsthetics, and I have nothing to take back of what I said. A great many operations are performed with the aid of anæsthetics that would be impossible without them; but an anæsthetic is given in a great many cases where it ought not to be. I am of opinion that dentists should not give chloroform at all. Deaths in the dental chair are almost always from chloroform. I was in the habit, when at Mount Holly, of giving a mixture of seven parts ether to one part of chloroform; but after having a nearly fatal case, I abandoned its use. I now use nitrous oxide.

In regard to the clap-trap we hear so much of, about gas being dangerous when it is not fresh, and the demands of patients to have fresh gas, the fact is that the only time that gas is not fit to be taken is when it is fresh. The only deleterious property found in nitrous oxide gas is chlorine gas, and the fresher the nitrous oxide is, the greater the proportion of chlorine contained in it.

I often persuade my patients not to take gas for a small operation, and in nine cases out of ten they thank me for having so advised them.

DR. C. A. MEEKER: I value anæsthetics and appreciate the good they have done, but I never administer one without feeling the great responsibility of it, particularly because I am a young man and the public would be more severe upon a young man, in case of accident, than upon those of you who have more grey hairs and honors. Ether I never give without the presence of a physician.

DR. HANKS: I was told by Dr. ————'s assistant, in whose office a patient died some time ago from nitrous oxide, as was supposed, that it was their custom when their gas run short to pour a few drops of chloroform into the bag, blow it up with the breath and give it the same as gas. The death that occurred in that office may have been the result of taking that kind of gas.

I advise dentists, if they want to escape the responsibility of accidents in giving anæsthetics, to go with their patient to the physician's house. The locality only is prominent in the public mind, and if the accident happens in your office you will be held responsible, no matter if you have twenty-five physicians there.

Speaking of patients ceasing to breathe under the influence of nitrous oxide gas, I understand that Colton never extracts a tooth without pushing it twice to the point where the patient ceases to breathe; that after they cease breathing he removes the tube a moment until respiration returns, then applies it until they cease breathing the second time, before he pulls the tooth.

DR. F. C. BARLOW: I understand that it is the common practice with some dentists, for the purpose of keeping the patient under the influence of the gas for a greater length of time, in order to perform a long operation, to drop a few drops of chloroform into the nitrous oxide bag with the gas. That I have been told by the dentists themselves.

I understand that Dr. ——, of New York, has a method of extracting teeth painlessly by the use of ether spray applied outwardly.

DR. BROWN: That is the application of an ether spray to the point of exit of the fifth pair of nerves, thereby paralyzing the entire nerve. I believe it is claimed that by the use of it no sensibility is felt in any part of the face.

DR. OSMUN: As incidents of office practice are being discussed I will mention one more. Some six or seven years ago a gentleman came into my office to have several teeth removed under the influence of nitrous oxide. He was, and had been for two or three years, suffering from what was called consumption, and he said he did not care if he did die from the gas, he had suffered so much, and the doctor had told him he must die in a week or two anyway. I required him to bring his physician. He did so and the physician told me I might give him the gas. He had a lot of old roots in his mouth; there was a copious discharge of pus and his mouth was in a distressing condition. I administered the gas, extracted fourteen or fifteen roots, and he came to, all right. When he came into my office he could just crawl up stairs with the aid of his physician, and was just ready to lie down and die. And that man

is alive to-day, and is as strong and healthy a man as you can find anywhere.

DR. WELCH: Do you attribute his recovery to the removal of his teeth?

DR. OSMUN: I leave it to others to form their own opinions on the case.

DR. OSCAR ADELBERG: About twelve years ago, when I was in Dr. Kingsley's office, Drs. Lacey and Carpenter, who were at that time giving medicated inhalation for the cure of consumption, sent us a patient to take the gas who said he had only one lung, and who was so far gone that he could hardly get into the office chair. Dr. Kingsley objected to giving him the gas. He said: "Never mind that; Dr. Lacey sent me here to take the gas; he says the gas you give is so very nearly the same as that which he gives me that I may take this." We gave him the gas, and after taking it he said he had not felt so well and strong in years.

I remember another case of a gentleman dying with consumption whose physicians prescribed laughing gas for him. He sent a seven-gallon bag to our office twice a day to be filled, and that man was kept alive for two months on nitrous oxide gas.

DR. MEEKER: The imagination of the patient has something to do with these cases, else peppermint oil is also a specific for consumption. Some two years ago a lady suffering with consumption came to my office and desired to make an arrangement with me to take nitrous oxide gas. I agreed to administer it to her and told her I would not charge her anything. I had a separate gas-bag into which I used to put a little oil of peppermint, and I let her take the air saturated with peppermint. She came every second day for three weeks to inhale it; she thought she was being greatly benefited, and at the end of three or four weeks she went home feeling very much better from taking air saturated with oil of peppermint.

DR. J. P. GERAN: I have given the gas over 3,000 times and I have not seen the slightest bad effects from it. One of my patients came to have eight teeth extracted. Thinking her not a fit subject to take gas I persuaded her not to take it, and I extracted one tooth without it. She gave one lurch, every muscle became as rigid as a stick and she apparently did not breathe at all; I thought she never would. I commenced artificial respiration, and it was about half an

hour before she recovered. She insisted on having the other teeth out. I consulted a physician, stated the effect of extracting the tooth without an aænsthetic, and, by his advice, I gave her gas. About two hours after the first operation I extracted the other seven teeth. She came to all right and I never had a patient take gas so nicely as she did.

DR. WALLACE: Speaking of the danger in using an anæsthetic being lessened as the amount of pain is increased, I have a case in point. A lady came to have her entire upper jaw cleared, and wanted an anæsthetic. At that time I was using a mixture of chloroform and ether, and I used in her case, I think, two parts ether to one of chloroform. She had not taken, I suppose, more than three inspirations before I noticed the muscles relax entirely and the circulation stop. I knew it was a case of life and death, and I was satisfied that the only thing that would restore life would be a shock to the nervous system. I extracted fifteen teeth and roots, not knowing whether I took them out of a dead or a living woman's mouth, and I don't think I ever extracted fifteen teeth so rapidly in my life. The moment I was through I examined the patient, found there was a reaction, and she came to, eventually.

DR. WELCH: You saved her life by extracting the teeth.

DR. WALLACE: No doubt of it. I am confident that the amount of pain saved the life of my patient. Six months afterward that woman died of heart disease. For thirteen years I have been using nitrous oxide constantly, and with two exceptions my patients have got through without any difficulty. Three years ago Dr. Ireland sent me a patient who had heart trouble, telling me to give her gas, but to watch her carefully. I administered gas and extracted two teeth. She was unconscious afterwards for eight or ten minutes, there was every appearance of a sinking condition, and undoubtedly had there been no operation she would have died, and had the operation been prolonged she would have come to more rapidly. I think nitrous oxide the safest anæsthetic we have.

TWENTIETH ANNUAL SESSION OF THE AMERICAN DENTAL ASSOCIATION.

The regular annual meeting of the American Dental Association convened in Huntington Hall, of the Massachusetts Institute of Technology, Boston, on Tuesday, August 3, 1880.

The president, Dr. L. D. Shepard, of Boston, called the association to order at 11 o'clock, a. m. Prayer was then offered by Rev. Dr. Studley, of Newton.

About one hundred members and delegates responded to the roll call.

The president welcomed the members to the city of Boston in a brief address, alluding to the only previous meeting of this body that had ever been held in Boston, that of 1866.

The following amendment to the constitution was adopted:

"Any report, or other paper, to be entitled to publication in the volume of Transactions for the year in which it shall be presented to the association, must be placed in the hands of the Publication Committee on or before the first day of September, and must also be so prepared that the proof-sheets furnished the authors shall be returned to the committee without material alteration or addition.

"Every paper received by this association, and all plates or other means of illustration, shall be considered the exclusive property of the association and shall be published for its benefit."

This amendment was found necessary to prevent the publication of the papers read before the association by their authors previous to the issue of the annual volume of Transactions.

An amendment was adopted providing that the members of the Publication Committee should be selected from the association, and not, as heretofore, from the Executive Committee; and another, that members suspended from their local society, equally with those that were expelled, should forfeit membership in the association.

Dr. Birge, of San Francisco, having resigned two years ago, asked by letter to be reinstated on payment of annual dues for intervening years. It was decided that the association had no such power, and that a member having resigned must come in by the regular way, the same as a new member.

At the evening session the resignation of Dr. R. Finley Hunt, of Washington, D. C., was offered and accepted.

Dr. Harlan, of Chicago, chairman of the special committee appointed to confer with the American Dental Convention and the National Dental Association, relative to uniting the three bodies into one, reported that in the opinion of the committee it would not be "wise or materially contribute to that end for this association to disband or in any manner assist in the formation of a new organization;" that, this association possessing all the requisite qualifica-

tions of a truly national body, the committee recommends that it take no action which would in any way tend to impair its usefulness or terminate its existence. The report was adopted without dissent.

The privileges of the house were extended to Dr. George W. Field, of London, England, who was present.

Reports of sections being in order, Dr. F. M. Odell, of New York, from the Sixth Section—Pathology, Therapeutics and Materia Medica—announced two papers and a report of cases.

Dr. W. N. Morrison, of St. Louis, related three cases of disease of the antrum. First, that of a young man who complained of a heavy feeling in the right side of the face. An examination of the teeth of the affected side revealed no probable cause of the trouble complained of. The teeth of that side contained only one filling, and suspecting a dead pulp, the filling was removed and an effort made to open the pulp chamber. Drilling towards the pulp soon developed sensibility, showing that the pulp was alive. Pain and swelling were increased on the following day, when the gum was painted with tinct. iodine, but with no perceptible benefit. On the succeeding day the gentleman, on blowing his nose, started a copious discharge from the nostril of the affected side, after which the swelling subsided and the case recovered without further treatment. In the second case, that of a lady, the pulp of the second right superior molar was dead, and that of the adjoining third molar was exposed. Pain not so marked as in the first case, but patient complained of heaviness on rising in the morning. On stooping to pick up a pin, the natural passage into the nares was opened, and the contents of the antrum escaped through the nostril, and the case recovered. The third case, that of a gentleman, was one of long standing; a right superior molar had been previously extracted for the relief of a swollen face. His physician failing in his diagnosis, sent his patient to a dentist, who found the antrum filled with a semi-solid substance, which, on being withdrawn by pumping, coiled like a rope into the spittoon. Dr. Morrison advises treatment through the natural opening, which, if necessary, should be enlarged.

Dr. C. A. Brackett, of Newport, R. I., read a paper on the properties of certain drugs. First, the influence which belladonna exercises over the flow of saliva. Given in doses of five or more drops

of the fluid extract, it visibly lessened that excessive flow of saliva often encountered by the dentist. Dr. A. F. Angell first suggested its use for this purpose as long ago as 1870, and since that date Dr. A. had used it with success. The sedative action of this drug, he claimed, was also advantageous.

The second point in the paper was the effects produced upon the teeth by medicines employed upon them, notably the acids. He cited a case where the teeth had been seriously injured by the use of tannin, frequently applied to diseased gums. He condemned the use of alum, either applied to the teeth or as an ingredient in tooth powder; also, phosphoric acid, the fluid of Dr. Wetherbee's dental obtundent, salicylic acid and tincture of myrrh. This latter, deliquesced chloride of zinc, a mixture of one part glycerine and two of tincture of aconite root, the fluid of Fletcher's Artificial Dentine, of Smith's oxy-chloride, of Poulson's cement, of agate cement and the paste of Fletcher's dental porcelain, all showed an acid reaction. These tests show that great care and caution should be exercised in the use of substances with whose chemical reaction we are not familiar. Cements and pastes may lose their acid property when combined for use, and some of them do.

The third point related to the obtuding of sensibility in dentine. It is well known that exclusion of fluids and the drying of dentine lessens the sensibility. Until recently only mechanical means have been relied on for diminishing the pain of excavation; of late, chemical agents have been resorted to, and among these, glycerine and absolute alcohol, combined with tincture of aconite root or other corrigent is regarded as the best now known.

Dr. T. D. Shumway, of Plymouth, Mass., claims to have discovered this use of the last named substances, and thinks that his experiments led to the subsequent development of "Naboli" by other parties.

Dr. S. J. McDougall recommends the use of the warm-air syringe as the best dental obtundent, but supplements its use by the following formulas:

Absolute alcohol.....℥ss;
Glycerine .....℥ss;
Tannic acid.....3ss. M.

or

Absolute alcohol.....ʒss;
Glycerine.....ʒss;
Zinc chloride.....ʒss. M.

Dr. Brackett regarded the apparent conflict in the claims of different experimenters as the result of independent personal experiments, and believed all to be honest in their endeavors.

Prof. Wetherbee, of Boston, contributed the following formula:

Concentrated sol. phosphoric acid.....ʒj;
Chloroform.....ʒij;
High proof alcohol.....ʒvj to viij;
Morphia sulph.....gr. cxxv. M.

Add in the order named and triturate in water.

He then spoke of the formation of the "Naboli" company and of the action of the Massachusetts State Dental Society in relation thereto. With these particulars our readers are already familiar.

Dr. R. R. Andrews, of Boston, remarked that in testing the oral secretions of his patients he had found quite as decided an acid reaction as Dr. Brackett had in the drugs and filling materials mentioned in his paper. If the fluids of the mouth are acid, the contents of a cavity of decay will present the same chemical condition. Bicarbonate of soda or other alkaline antidote should be employed to neutralize the acid condition of the cavity before filling. No cavity should be filled while free acid is present in the cavity.

Dr. H. C. Meriam, of Salem, Mass.: Medicines that injure the teeth out of the mouth, may not do so when used in the mouth. The teeth in the mouth are covered with a coating that serves as a kind of varnish, which protects the teeth against the action of acid medicines.

Dr. Odell read a paper on the "Physiology, Pathology, and Therapeutics of Hyperæmia, however induced" (*taking cold*), in which he showed that catarrhal affections were in a great degree dependent on general debility and the lack of proper hygienic precautions against disease, such as exercise in the open-air, sunlight, suitable food, and sufficient sleep.

On the morning of the second day, Dr. C. S. Stockton, of Newark, N. J., read the report of the Committee on National Dental Directory. The report stated that complete lists had been obtained from the District of Columbia, and from the states of Indiana, Mis-

souri, Texas, Kansas, Nevada, New Jersey, and the territories, and that the states of Louisiana, Virginia, Kentucky, Massachusetts, Vermont, New Hampshire, Rhode Island, Maryland, Maine, South Carolina, Illinois, Wisconsin, New York, and Arkansas were nearly completed. The report advised a yearly revision of the lists, or otherwise they would soon become of little value.

Report received as a report of progress, and committee continued.

Dr. H. J. McKellops, of St. Louis, offered the following resolutions:

"WHEREAS, It is desirable that the dental profession, as a body, should give countenance to no other material for filling teeth but the best, and encourage the greatest attainable thoroughness in the treatment of diseased teeth; and,

"WHEREAS, Of late years many different alloys for the compounding of amalgams have been presented to the profession for their adoption, and put upon the market by the manufacturers, warranted to resist chemical change and thermal influence; and,

"WHEREAS, Some few members of the profession have seen fit to engage in the manufacture of said alloys for the formation of amalgams, and have used their position as professors to promulgate the doctrine of the superiority of amalgam compounds over all other materials as a filling for the preservation of the teeth; and,

"WHEREAS, Other members of the profession, holding responsible positions in some of our best colleges, have permitted their names to appear in connection with the said advertisements, setting forth the many fine qualities and rare virtues of these compounds, thereby giving countenance of a scientific character to the sale and use of these compounds; and,

"WHEREAS, Many members of the profession are but slightly acquainted with the many principles involved in the choice of the best material for filling, and very naturally look up to the professors in their scientific character as authority in all such matters; and,

"WHEREAS, There is a peculiar impropriety in professors lending their names to the advertisements of these or any other compounds, inasmuch as charlatans lose no opportunity to exhibit and parade the names of these professors before an ignorant community, in justification of their constant use of an inferior material for filling teeth; now, therefore, be it

"*Resolved*, That this association discountenance in a formal and emphatic manner the pernicious practice of members of the profession, but more especially those holding high positions in our schools, of allowing their names to appear in advertisements as indorsing either any special material or compound for filling teeth, or any therapeutic agent whatsoever."

Dr. W. H. Atkinson, of New York, opposed the passage of the resolutions on the ground that it was unjust to condemn without investigation, and thought they should be well considered before they were voted on. He said, if they were aimed at Chase and Flagg, why not say so? Every man who has a soul has been pained by the idiocy of the claims put forth by these gentlemen. Still we should not suppose ourselves yet at the top of the ladder, but should remember that very little has yet been accomplished in demonstrating what materials will best prevent decay of the teeth. If we take the statistics of treatment, who is competent to pronounce *ex cathedra* the final judgment?

Dr. E. T. Darby, of Philadelphia, spoke in favor of the resolutions, saying that they were not aimed at any one individual, but at the habit, indulged in by some, of indorsing the materials of manufacturers. When manufacturers supply materials to practitioners for use in their practice they expect a return therefor, either in money or some other form. He hoped the day was at hand when filling materials would go upon their merits and not upon the indorsement of any one.

Dr. W. H. Morgan, of Nashville, Tenn., thought the matter was a question of ethics that was covered by the Code. He censured the indorsement by those high in authority, of preparations about the composition of which they knew little or nothing. He favored the passage of the resolutions.

Dr. W. W. Allport, of Chicago, did not think the recommendations had been given with the idea that they were to be made public. We certainly have the right to express our opinion, and we could scarcely suppose that any respectable practitioner would give a recommendation in return for materials received.

Dr. McKellops sent to the desk of the secretary a dental journal containing an advertisement of a filling material, accompanied by the recommendations of seven professors in dental colleges.

Dr. W. C. Barrett, of Buffalo, inquired if the private correspondence of any one had been invaded in obtaining these indorsements. His own correspondence had been so used and when he saw his name in print he had it withdrawn.

Dr. George A. Mills, of Brooklyn, N. Y., maintained that he had a right to say what he could, truthfully, in favor of any good material, and that he knew his name was going into print when he gave the recommendation.

Prof. T. L. Buckingham, of Philadelphia, thought it was a nice point to determine whether it was proper to recommend any article, publicly or privately. He was called on to give an indorsement to this same material, but declined for the reason that the manufacturer refused to give him the formula. He contended that we had a right to recommend anything that we knew to be good, but held that a recommendation of any secret preparation should not be given.

Dr. Morgan claimed that if the components and method of preparation were known, the practice of giving these testimonials tended to lower the dignity of the profession. It was not the custom with physicians.

The resolutions were adopted with a few negative votes.

By unanimous vote, the proprietors of dental exhibitions were requested to close their sales rooms while the association was in session.

The consideration of section six, Pathology, Therapeutics and Materia Medica was resumed.

Dr. Morgan thought further discussion of these topics would be useful, especially that of diseases of the antrum. Dr. Morrison's cases, presented the disease in its simplest forms, catarrh of the antrum, and required only simple treatment.

Occasionally we meet with cases of a much more serious nature. One, which he would relate, was that of an elderly gentleman which was cured in ten days by opening the cavity and injecting mild escharotics. More recently, another case—the patient having a strumous diathesis, had been diagnosed by a physician as softening of the brain—was put under rigorous treatment, opening and cleansing the cavity, and was cured in about six weeks. A first step is to always open and explore the cavity in order that the treatment may be intelligently chosen.

Dr. J. G. W. Werner: Necrosis of the antrum should not be treated by the injection of escharotics into the cavity; the less of escharotics the better. Injections are painful, and tend to partial destruction of the mucous membrane. Keep the parts warm, and cleanse with a little warm water and salt. Had a case which had been in progress two years; system lowered from pregnancy at the time it came into his hands; kept the parts warm by steaming with rum or brandy; injected very little; avoided irritation; result good.

Dr. Atkinson: As you hope for success, avoid warm applications; use either hot or cold. Irritation, when pushed beyond the point of healthy nutrition becomes inflammation; but, short of that, it acts as the kindly friend which gives force to the nutritive processes. Has known abscess of the antrum to run for ten years, and on opening the cavity nothing but a glairy fluid escaped; simple washing effected a cure. Necrosis occurs only when you have deterioration of the tissue. In such cases, a surgical operation is the only remedy.

Dr. Werner asked if we never had inflammation without constitutional deterioration.

Dr. Atkinson replied that no animal in a state of nature ever had inflammation when wounded; the wounds heal by first intention. The same is the case with a healthy man.

Dr. Mills had a case; opened the antrum at the third molar; treated with warm water and salt, following with aromatic sulphuric acid for two days, when the milder treatment was resumed. The case progressed well, with a slight relapse, and was cured in about two weeks.

(TO BE CONTINUED.)

LECTURES ON THE PHYSICAL EXAMINATION OF THE MOUTH AND THROAT.*

THE PHYSICAL SIGNS DERIVABLE FROM THE BREATH, LIPS, TEETH, AND MOUTH.

BY G. V. POORE, M. D., F. R. C. P.,

Professor of Medical Jurisprudence, University College; late Assistant Professor of Clinical Medicine; Assistant Physician and Physician in Charge of the Throat Department of the Hospital, etc.

(From the "Lancet.")

GENTLEMEN.—It is my duty to bring to your notice the various physical signs of disease which are to be obtained from an examination of the throat and windpipe; but inasmuch as it is impossible to properly examine the throat without at the same time examining the mouth and nose, I think I shall be best fulfilling my duty by dealing methodically not only with the throat, but also with the oral and nasal cavities which lie above it.

The physical signs met with in these regions of the body appeal not only to the sight, touch, and hearing, but occasionally to the sense of smell as well; and the first thing which forces itself on our attention is often the odor of the breath.

The *smell of the breath* is a valuable physical sign, and in many diseases is so characteristic as to enable the man of experience to form a diagnosis from it alone with almost absolute certainty. It is impossible to describe the various odors of the breath; experience alone will enable you to distinguish one from the other, and I shall merely content myself with catalogueing some of the most distinctive of them. The smell of drink is the most common of all, and in cases of insensibility is often a valuable indication of the cause. It may give a valuable hint as to the habits of the patient; and I would here remind you that over-indulgence in alcoholic liquors is one of the most common causes of congestion and catarrh, both of the pharynx and larynx. You must not run too quickly to the conclusion that because a man's breath smells of drink he is necessarily a drunkard, for a single glass of wine or beer is sufficient to impart an odor to the breath for some time after it has been taken.

*Delivered to the Junior Class of Clinical Medicine, University College.

When directing attention to the alcoholic smell of the breath in the presence of the patient, I am in the habit of speaking of it as *oinosmia* since patients naturally resent having attention bluntly called to the fact that they smell of drink.

The presence of carious teeth imparts an odor to the breath which is quite characteristic, and which, according to Mr. Salter, resembles no other odor except that given off by the genus of neuropterous insects called Chrysopa. Want of attention to the mouth and allowing food to lie between the teeth and decompose, or the presence of decomposing matters in the crypts of the tonsils, imparts a foul odor to the breath. A disordered stomach also causes the breath to be fetid.

A peculiarly disgusting and perfectly characteristic odor of the breath is present in those cases of chronic inflammation of the nasal and pharyngeal cavities, which are known from this fact as ozæna, and which are most often due to caries or necrosis of the nasal bones, which is generally of syphilitic origin. The smell, however, may be present without any disease of the bones in cases of chronic inflammation of the cavities occurring in scrofulous subjects.

In cases of dilatation of the bronchial tubes accompanied by ulceration and copious purulent discharge, the smell of the breath is peculiar and almost diagnostic of the condition, and in gangrene of the lung the odor of the breath reaches a degree of foulness which, once smelt, can never be forgotten.

In cases of fever with high temperature, a dry mouth, and the accumulation of sordes on the teeth and gums, the smell of the breath is peculiar. In pyæmia and in diabetes the breath has a sweet odor, but the odor in each of these diseases is perfectly distinguishable.

With inflamed gums the breath is apt to smell. This is peculiarly the case in patients under the influence of mercury, and the term mercurial odor of the breath is one in common use. In scurvy the breath is apt to be very foul. It is needless to say that certain articles of diet, as garlic and onions, and certain drugs, as turpentine, copaiba, and some of the essential oils, are detectable in the breath.

The *inspection of the lips* is capable of furnishing many facts which are of the greatest service in forming a diagnosis. The *form* of the

lips is characteristic in different races; thus, the thick lips of the African negroes and the thin lips of most European races are well known. In conditions of general plethora the lips look swollen and big. A few cases have been recorded of great hypertrophy of the lips and neighboring parts, a notable example being given by Mr. Barnwell in the eighth volume of the "Clinical Society's Transactions."

The *color* of the lips is a matter of great importance. After great loss of blood the lips may appear of a waxy whiteness, and such an appearance should at once lead to questions likely to elucidate this point. A recent confinement attended by hemorrhage is the most common cause of this appearance in women. Anæmia and leucocythæmia, arising from no matter what cause, produce a pallor of the lips, and in investigating cases of anæmia, we invariably look to the mucous surface of these parts. It is right to remind you, however, that undoubted evidence of hydræmia may be present without any very obvious alteration of the tint of the lips.

The lips are often unduly red in cases of general plethora and in the early stages of many febrile conditions. A cyanotic tint of the lips may be due to extreme cold, to those malformations of the heart which give rise to the condition known as cyanosis, and to mal-aëration of the blood arising from no matter what cause, atmospheric, pulmonary, or cardiac. A patch of herpes on the lips (herpes labialis) is very commonly seen. It is a common accompaniment of an ordinary cold, and it is well to bear in mind that such an appearance may be indicative of more serious trouble, such as pneumonia. It is sufficiently often an accompaniment of pneumonia to make it incumbent upon us always to investigate this point when we are confronted with a patch of herpes on the lips.

In febrile conditions the lips get dry and cracked, and sordes accumulate upon them. Sordes are collections of dried mucous, evaporated saliva, and food particles which cannot be removed, owing to the general dryness of the mouth and the paucity of the salivary secretions. This condition of the lips is seen in the most extreme degree in the state known as the typhoid condition, in which also the lips are often brown or almost black.

Round the margins of the lips are occasionally seen cracks, white lines, and little pits, the latter reminding one of the appearance

known as the lineæ albicantes which occur on the abdomen after pregnancy. These appearances occurring on the lips are sufficient to raise a suspicion of congenital syphilis. The other indications of syphilis which we may find upon the lips are: 1. A true infecting sore or hard chancre, which is happily rare; and, 2. Mucous tubercles, which may be present in cases of congenital or acquired syphilis. These mucous tubercles have the same appearance when seen here as when seen elsewhere—flat, slightly elevated patches, with a dirty-whitish surface, surrounded by a congested areola. Epithelioma is among the more rare diseases of the lips, concerning which one should be on one's guard.

The *movement* of the lips is a matter of great diagnostic importance. The muscular power of the lips may be impaired or abolished in several distinct conditions, such as hemiplegia, facial palsy, bulbar or labio-glosso-laryngeal paralysis, and general paralysis of the insane.

In hemiplegia the lip palsy is often slight, and in very slight cases which have partially recovered, a trifling drooping of the prolabium of the upper lip on one side, just sufficient to destroy the symmetry of the "Cupid's bow," is all that we can detect. The observation of this slight drooping and want of symmetry should always lead to an investigation into the history of the patient, and to questions likely to elucidate the question of hemiplegia. In marked cases of hemiplegia, and in cases of facial palsy from disease or injury to the trunk of the facial nerve, the paralysis of one-half of the lips is easily demonstrated, and on asking the patient to show the teeth it will be observed that the teeth are imperfectly exposed on the paralysed side, and the angle of the mouth is drawn over to the sound side. Facial palsy may be double, and then this want of symmetry is not observed, but the face is expressionless, and the teeth and gums cannot be exposed.

In bulbar paralysis the condition is usually bilateral, and the patient is quite unable to move the lips. In the latter stages of this disease the lips waste and the under lip droops so as to expose the gums and allow the saliva to run out of the mouth.

In general paralysis of the insane there is a paretic condition of the lips, and when they move they do so in a hesitating, jerky manner, which is very characteristic.

In alcoholism the movement of the lips is also often tremulous. In chorea the lips are liable to those uncertain, jerky movements which are so characteristic of this condition. In "muscular tic" one side of the mouth may be the seat of spasmodic movement. Lastly, in tetanus and spinal meningitis there occurs that condition which is called the risus sardonicus, which is caused by a spasmodic retraction of the angles of the mouth.

Dribbling of saliva is a symptom which is due to many causes. It may be due to an excessive secretion of saliva, a condition seen in cases of mercurial poisoning and in some other states. It is present in cases where there is deficient movement of the lips and tongue, as in bulbar paralysis, or in cases where the movement of the tongue is rendered impossible or painful by the presence of sores and ulcers. In patients also with whom the act of swallowing is impaired or painful, as in cases of paralysis or stricture of the pharynx, or inflammation of the tonsils or throat, dribbling of the saliva is apt to occur. In children, dribbling is a physiological condition, owing to a want of vigor and purpose in the movement of their lips and tongues, and in idiots this infantile condition would seem to be permanent. Old writers considered the dribbling of saliva to be characteristic of idiots and madmen.

An *inspection of the gums* occasionally affords important evidence of disease. Their *color*, like the color of the lips, may be pale, or red, or livid, and is an indication of anæmia or plethora, or those conditions mentioned in connection with the lips which give rise to a cyanotic tint. The gums are sometimes spongy and congested and liable to bleed at slight causes. This is often the case in depressed conditions of health, arising from whatever cause. It is present in a marked degree in persons who are under the influence of mercury, and to a less extent in those who are taking iodide of potassium. In leucocythæmia and in Hodgkin's disease the gums are often swollen and pale, and occasionally they are stated to become gangrenous. In purpura, hemorrhage from the gums is a common occurrence. In scurvy the gums are very greatly and remarkably affected. They become sore and apt to bleed at the slightest touch, and get swollen, spongy, and livid. The lividity is stated to be most marked at the free edges. The swelling of the gums is so great as occasionally to obscure the teeth, and in ex-

treme cases they protrude between the lips. They get livid and almost black, and undergo sloughing and ulceration, which causes the breath to be peculiarly offensive. The sloughing may leave the roots of the teeth exposed, and in such cases the teeth commonly fall out. Dr. Buzzard states that this condition of the gums is by no means invariably present in scurvy, and that all the other symptoms of the disease may be present in a marked degree while the gums are not noticeably affected. Indeed, the gums in scurvy may occasionally be paler than usual and contracted.

A blue line upon the gum may, in the vast majority of cases, be taken as certain evidence that the patient is suffering to a greater or less extent from lead-poisoning. This "blue line" is due to a deposit of lead sulphide in the tissues of the gums. Dr. Hilton Fagge has made sections of the margin of a gum affected with a lead line, and by the aid of the lower powers of the microscope was able to see that the discoloration was not uniform, but was distributed in the form of rounded loops. The pigmentation was seen to be due to minute granules, and these granules were situated sometimes in the interior of the smaller blood-vessels, and sometimes outside them in the tissue immediately adjacent. The deposit is in reality black, its blue appearance being due to the fact that it is seen through a thin translucent layer of gum. Care must be taken not to mistake the purple congested edge of the gum of persons who do not clean their teeth for the deep blue line which is caused by lead. The blue line is produced by the action of hydrogen sulphide upon the lead which is presumably circulating in the blood. The hydrogen sulphide is produced by the decomposition of food particles lodging between the teeth and adhering to the tartar. Persons who are careful to keep the teeth clean, and in whom no decomposition of the food particles takes place, may be suffering from lead-poisoning and yet have no lead-line upon the gums. The lead-line once formed, and being due to the deposit of an insoluble salt, may remain for months after the system has been freed from lead. Persons who have been exposed to the action of lead may exhibit no line upon the gums until after the administration of iodide of potassium. This is difficult of explanation, but the fact admits of little doubt. The blue or black discoloration caused by lead is not always limited to the mar-

gin of the gums, but may occasionally form black patches on the inside of the lips or cheeks.

Occasionally among the ill-fed and dirtily-kept children of the poor, and especially during the first dentition, the gums become swollen and the edges ulcerate, the ulcerated surface being covered with a dirty-gray secretion. This condition is known as gingivitis, accompanied by offensive breath and some increase in the flow of saliva.

The *teeth* often afford valuable evidence of constitutional conditions. Delayed dentition is apt to occur in children that are debilitated from any cause, but more particularly is the case in rickets. Finding the dentition delayed, we should always search for other evidence of rickets.

The milk teeth should begin to appear at the seventh month, and should all be "cut" by the end of the second year. The teeth appear in the following order—central incisors, lateral incisors, anterior molars, canines and posterior molars; and each of these five groups appears by the seventh, ninth, twelfth, eighteenth and twenty-fourth month; the number of teeth which a child should have at the end of the months named being four, eight, twelve, sixteen, twenty. It may be some help to the memory to call attention to the fact that when a child is twelve months old there should be twelve teeth in the mouth. These numbers are liable to great deviation even in health. Some healthy children are precocious, while others are backward in the matter of dentition. The teeth may be wholly or in part deficient as the result of congenital defect. Caries or decay of the teeth is so common in this country that very few escape from it. It is more common in women than men, and is predisposed to by pregnancy and by the scrofulous and tuberculous constitutions. It is said to be caused by the generation of acid from the fermentation of food particles lodged between the teeth. There is a condition known as "rocky" enamel, in which the enamel of the teeth is grooved and pitted and honeycombed. This condition is brought about by rickets, or by any depressing illness occurring during dentition. Occasionally the teeth get excessively worn, so that they appear truncated, and the dental arch presents the appearance of a flat level border, the exposed dentine present-

ing a yellowish appearance. This condition, of which a very good example was lately attending in my out-patient room, is rare, and is said to be predisposed to by syphilis, and to be favored by the use of gritty food. Mr. Jonathan Hutchinson has pointed out that a peculiar condition of the permanent teeth often exists in patients who are the subjects of inherited syphilis. The incisors and canine teeth are small, peg-like in shape, narrow at the free edge, and either excavated by a crescentic notch at the margin or marked by a crescentic groove. The conical condition is most marked, according to Salter, in the lower, and the crescentic notch is most conspicuous in the upper, incisors. When the teeth are lost very early in life, inquiry should always be made as to whether the patient has taken much mercury, and if so, for what reason.

The *mucous membrane of the mouth* is sometimes swollen and red as part of a general catarrh. It may be swollen in consequence of gastric irritation brought about by errors in diet. In children who are ill fed, and especially during dentition, small, circular, painful ulcers called aphthæ very frequently appear upon the gums and the internal surface of the cheeks. They are almost always an indication of gastric disturbance from injudicious feeding. When we get the mucous membrane of the mouth inflamed, and upon the inflamed surface a parasite fungus (the oidium albicans) growing, we have the well known disease called thrush. The mouth, tongue, and palate, and pharynx may be covered with white patches, and we may be in doubt whether these patches are due to curdled milk or diphtheria but if a small quantity be placed under the microscope with a drop of caustic potash, the well known mycelium and spores of the oidium albicans are easily seen, and serve to clear up all doubts. Whether the fungus is the cause of the inflamed condition, or whether the inflamed patches form a fitting nidus for the growth of the fungus, is an open question. Thrush never occurs in well nursed children, and if a young child is fed upon good milk and nothing else, thrush seldom appears. When, however, mothers give farinaceous matter to very young children, often combined with milk which is slightly sour, this sticky mixture adheres to the inside of the mouth, and if the mouth be not very carefully cleansed out after every meal, the decomposing food particles irritate the mouth,

cause it to inflame, and form a soil upon which the oidium grows luxuriantly.

Thrush is liable to occur in adults towards the termination of chronic illnesses, when they are too weak to cleanse their mouths by vigorous movements of the tongue. I have seen patches of thrush also occurring in a patient the subject of labio-glosso-laryngeal paralysis, because the movements of the mouth were too feeble for the purpose of properly cleansing it. The lesson to be learnt from these facts is that in feeble persons the mouth needs to be artificially cleansed after feeding, by being sponged out with some antiseptic, such as a solution of borax, or, perhaps, there is nothing better than peppermint water, which to many persons is agreeable and refreshing.—*British Journal of Dent. Science.*

IOWA STATE DENTAL SOCIETY.

The eighteenth annual meeting of the Iowa State Dental Society was held at Oskaloosa, Iowa, on Tuesday, July 13, 1880. The following officers were elected for the ensuing year:

President, M. L. Jackson, Oskaloosa; Vice-President, A. O. Hunt, McGregor; Corresponding Secretary, L. C. Ingersoll, Keokuk; Recording Secretary and Treasurer, E. E. Hughes, Newton.

E. E. HUGHES, Secretary.

We copy the following from the "Shanghai Courier," of July 30, 1880. Friend Hall has done the sensible thing, and we wish the happy pair a perpetual "honeymoon," and eventually a safe return to the land of their nativity.

MARRIAGE—At Shanghai, on the 28th of July, at the residence of O. N. Denny, Esq., United States Consul-General, Dr. James Ward Hall, to Miss Alice M. Barney, eldest daughter of Charles E. Barney, Esq., St. Louis, Mo., U. S. of America.

BOOK NOTICES.

THE STUDENT'S DOSE-BOOK AND ANATOMIST, COMBINED. By C. HENRI LEONARD, A. M., M. D., Prof. of Med. and Surg. Diseases of Women and Clin. Gynæcology, Mich. College of Medicine, etc., etc. Price, $1.00. Detroit: Leonard's Illustrated Medical Journal. 1880.

This book, undoubtedly, will be gratefully received by the younger members of the profession, and especially by the students. It contains a complete list of medicinal preparations and their doses, together with full directions for their reduction to the metric system.

The Anatomical Department briefly describes the Muscles, Nerves, Arteries, Veins and Bones, to which is added a chapter on promiscuous subjects.

THE BLACK ARTS IN MEDICINE. By the late JOHN D. JACKSON, M. D,, of Kentucky. Edited by L. S. MCMURTRY, M. D, ROBERT CLARKE & Co., Cincinnati: Price, $1.00, by mail.

An amusing satire denunciatory of disreputable arts and devices, resorted to by unscrupulous practitioners to secure patronage.

It is to be regretted that such a class of charlatans exists in any profession, as forms the subject of this sketch. But until there is an improvement in the material from which the professions are recruited, there can be little hope of extinguishing the class.

AMERICAN HEALTH PRIMERS—THE SKIN IN HEALTH AND DISEASE. By L. D. BULKLEY, M. D.,of New York, Physician to the Skin Department of the Demite Dispensary and of the New York Hospital; and

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SCHOOL AND INDUSTRIAL HYGIENE. By D. F. LINCOLN, M. D., of Boston, Chairman of Department of Health, American Science Association. Presley Blakiston, Philadelphia: H. R. Hildreth Printing Co., St. Louis.

The above are numbers X and XII of the series of health primers that have become very popular in this country, and have had a very

wide circulation. There are perhaps no other books containing so much practical information that is valuable to the general reader as do the volumes of this series.

These two are equal to the best of the former issues, and the latter should be in the hands of parents, and of every one engaged in school work, or in mechanical labor of any kind.

BOOKS AND PAMPHLETS RECEIVED.

NOTES ON OPERATIVE DENTISTRY. By MARSHALL H. WEBB, D. D. S., Lancaster, Pa.

VICK'S FLORAL GUIDE. Autumn, 1880.

ST. LOUIS PUBLIC SCHOOL LIBRARY BULLETIN. Bi-monthly; contains lists of recent accessions, and class lists, with descriptive and critical notes, designed to guide readers in the selection of books.

AMERICAN NEWSPAPER DIRECTORY. By GEO. P. ROWELL & Co., New York. A volume containing 1044 pages.

REPORT OF THE BUREAU OF ORGANIZATION, REGISTRATION, AND STATISTICS TO THE AMERICAN INSTITUTE OF HOMŒOPATHY, at its session held in Milwaukee, June 15, 1880.

THE MONTHLY INDEX TO CURRENT PERIODICAL LITERATURE, PROCEEDINGS OF LEARNED SOCIETIES, AND GOVERNMENT PUBLICATIONS. Published at the office of THE AMERICAN BOOKSELLER, 10 Spruce Street, New York.

THIRD ANNUAL BOOK OF THE MICHIGAN SPORTSMEN'S ASSOCIATION.

THE MISSOURI
DENTAL JOURNAL.

A Monthly Record of Dental Science and Art.

VOL. XII.—NOVEMBER, 1880.—NO. 11.

EXAMINATIONS CONCERNING THE FORMATION OF DENTINE.

By DR. J. ARKOVOY, of Budapest, Hungary.

(Translated by Louis Ottofy, D. D. S., Lebanon, Ill.)

There are but few subjects in the theory of dental science which arouse such great interest and which lead to so many different explanations and controversies as the formation of dentine. A great many authors have taken part in these examinations, and the dental, or rather the histological literature of the last fifteen or twenty years seems to have almost exhausted the subject. But still, being acquainted with the study of the development of tissues, we feel the insufficiency of proofs concerning the explanation of some points, especially those which more particularly refer to the soft-tooth tissue—the dentine cells. It will be to this subject that I particularly desire to draw your attention.

Before introducing the results of my own observations, it will be appropriate to give in brief the results of observations in reference to this subject which have been hitherto made.

By the excellent discovery and description of the soft fibrils in the dentinal canals, for which we owe our thanks to John Tomes, there is a new light brought into the histology of dentine so that dentine appears for examination in four separate divisions—one of which, however, belongs to the embryonic stage. The divisions

are: (*a*) Odontoblasts, (*b*) dentinal fibrils, (*c*) dentinal tubuli, (*d*) intertubular substance. The odontoblasts consist, according to Waldeyer, exclusively of protoplasm, which on being treated with chromic acid shows a granular contour line, but never a cell-membrane; from their central points they send out communicating branches to the papillæ. Hertz, on the contrary, notices peripheric dentine cells, which, by the condensed and chemically changed external protoplasmic layers appear to be encircled by a sharp seam, and in this manner it is that an "apparently condensed contour" is noticed. This is the basis on which rests his supposition of the existence of a membrane. After some hesitation Neumann agrees with him. Boll agrees with the opinion of Waldeyer, at the same time claiming the additional discovery of nerve fibers, which supply the dentinal canals to a certain extent. The drawing, which the latter gives as an illustration, shows indeed a beautiful connection between the odontoblasts.

In the course of this paper I will again return to his work. Lent draws the dentinal cells with two nuclei. Leydig considers the odontoblasts as cells and declares the teeth of lower vertebrate animals to be of a cuticular formation. He claims that the odontoblastic cells have nothing to do with the epithelium of the mucous membrane of the mouth, but that they originate in the changes in the connecting tissue of the papillæ. Kollmann agrees with this and also with Waldeyer's and Boll's opinion, that the odontoblasts are not membraneous cells, agreeing with Neumann as to their having one nucleus. Wenzel claims that the odontoblasts are devoid of a membranous covering and, also, that they have no sharply defined boundary line; the latter, however, appear after chemical treatment. In reference to their origin he agrees with Leydig. Hertz follows the subject by drawing the dentine cells with one nucleus and claiming that in some no nucleus whatever is to be found. This assertion contradicts his own words, in which agreeing with the somewhat diagrammatic drawing of Lent and that of Waldeyer, he sustains the opinion that the dentinal cells are formed by the fusion of several cells. In another place he states that the growth of the dentine cells consists in their being drawn out in length towards the papillæ, whereby the cells gradually receive extensions. He does not accept the existence of Waldeyer's connecting processes

towards the papillae as at this point he could see only round cells. In reference to the branches, that is, to the future dentinal fibrils the different observations more nearly agree. Lent was first impressed with the idea that certain parts of dentine were to be regarded as fibrils, but subsequently considered them to be canals. Tomes deserves the credit of having first demonstrated the existence of soft fibrils in the dentinal canals, and succeeding observations have proven their existence. The only exception on record is that of Mr. Salter, according to whom the contents of the dentinal canals are liquid. Beale's observations have proven that these fibrils originate from the odontoblasts, while later observations made by Kolliker agree with Tomes in considering the fibrils to be of a solid nature. Waldeyer treats this subject in altogether his own manner, by claiming that the fibrils originate from the protoplasm of the dentinal cells, in such a manner that after the deposition of lime salts for the formation of the canals has taken place, the remainder of the protoplasm remains in the middle of the odontoblasts in the "form of soft fibrils." Accordingly Waldeyer considers calcification as the process by which the odontoblasts receive their branches, and, according to this view, it could be said that while calcification proceeds towards the papillæ, the periphery of the cell, that is the fiber, grows into the dentine.

Boll illustrates very clearly the process by which the dentinal fibrils enter the canal and pass through them. He agrees in every point with Waldeyer. Beale represents the fibrils as proceeding from the nucleus of the dentinal cell. Hertz says, in reference to Beale's drawing, that the fibers represent small, clear drops, and the central soft part, the externally solidified dentinal canals. Furthermore, he attacks Neumann's "Toothlayers," and regards them as mistaken fibrils, partly agreeing with Kolliker, and disagreeing with Waldeyer. Hertz considers the dentinal fibrils as the direct "continuation of the odontoblasts," which by a constant reduction of the membrane lengthen themselves into thin fibrils. This assertion, therefore, is opposite to the opinions of Beale and Waldeyer. Wedl, in his excellent work, finds it composed, with great probability, from a thick cortical and a very tough semi-liquid central substance, which possesses the faculty of hardening when exposed to the atmosphere. He seems to agree with Hertz.

The dentinal canals form a subject of considerable importance with the authors. J. Muller was the first one to represent, by a mechanical process, the isolated dentinal tubule; he remarks that they show rigid projections upon the dentine fragment, which, by the aid of concentrated acids, can be made transparent and flexible; from this he arrives at the conclusion that it possesses an organic base; while Lent describes the tubule as being derived from the odontoblasts and their branches, claiming that the walls of the canals are formed from the same material. Kolliker, in his later observations, finds the dentinal canals without walls and almost the same as the remaining vacua of the dentine cells in the dentine substance, which latter seem to be filled with the fibrils of Tomes. Beale, Robin, and Magitot find that the dentinal canals of the papillæ increase in their diameter, while in advanced age they are obliterated. Tomes reached the same conclusion upon human teeth and the teeth of animals; this fact, he says, may have led Hertz to think that the fibrils only come very near to the dentine. According to Leydig, the dentinal canals in snakes are formed from branches of the epithelium covering the papillæ. The literature referring to this particular subject has been enriched through some very interesting observations made by Neumann. He found in human teeth, softened by an artistic process, that the canals are provided with distinct walls, which are not to be considered as the calcified membrane of the internal branches, but as the more solid and more compact parts of the calcified intertubular substance. In a later paper Neumann illustrates tolerably clearly what he calls "Toothlayers" (zahnscheiden), which were made visible in carious teeth. Waldeyer and Boll acknowledge in their respective treatises the existence of these "Toothlayers," and they were soon universally known. Only Kolliker and Hertz object, as they could not discover them. The latter says the fibrils lay in the space immediately adjoining the tooth substance, and a separate wall could not be distinguished.

Otherwise it may be considered that if the "Toothlayers" and the intertubular substance are the combined product of the secretion of the dentinal cells, there must be a more intimate connection between the two. Kollmann declares that the "Toothlayers" are formed from the elastic walls of the canals. Tomes, in writing of

caries refers to the common idea that "every canaliculus appears to be encircled by a thick layer." According to Wedl's explanation, the calcified layers are nothing more than the homogeneous foundation of the dentinal canals. Finally, I wish to refer to the chemical examinations of Hoppe, according to whom the canals, even after boiling in hot water and strong acids, remained insoluble; although the intertubular substance dissolved in gelatine.

The foundation, or intertubular substance offers us a subject upon which divergent opinions are held according to the results of the observations made. Hertz and Schwann have found that the intertubular substance has a fibrous structure, and that each canal runs between two fibers. Owen claims that the intertubular substance is first, and the walls of the canals second in the process of calcification. Raschkow asserts that the lime salts are deposited in the shape of layers around the fibrils; although Lent agrees with him in this opinion, he thinks that probably the interglobular substance is the product of a secretion of the Odontoblasts and their processes. Kolliker paid more attention to this idea, and inasmuch as he observed the rising of irregular molecules from the lime salts in the protoplasm of the odontoblasts, he becomes the founder of the well-known theory of secretion. Hannover claims that the walls of the canals owe their existence to the membrane and the contents of the cell, while the intervening spaces and their contents are due to the nucleus of the cell. The deposition of lime salts takes place first in the intervening spaces, then in the walls or sheaths, and at last in the intertubular substance. Waldeyer claims that there is no intercellular substance between the odontoblasts, and says: "Besides the odontoblasts, there is nothing that could calcify." Boll indorses the same by saying: "The *substantia eburnea* arises exclusively from the chemical and morphological changes of the odontoblast."

On the contrary, Hertz strengthens his opinion by claiming that the intertubular substance arises either from the substance of the pulp or from the dentinal cells. Furthermore, Hertz remarks that the slimy intercellular substance gradually changes into glutinous, and not immediately into such cells as are intended for the reception of lime salts. In agreement with Waldeyer and Boll, Tomes says: "There is no room for intercellular substance." Kollmann

accepts the words of Kolliker and Hertz, and favoring the theory of secretion held by the former, he adds that the odontoblasts are merely the means by which lime salts are deposited. In this sense Hertz also mentions his observations on treating odontoblasts with carmine, in which case the cells receive the tint, while the substance adjoining the intertubular substance, was not at all, or very slightly, colored. Right here may be mentioned the results of Mühreiter, who has led to the peculiar belief that the formation of dentine takes place through the blood vessels of the pulp, and that the odontoblasts merely play a passive part. At another place he attacks the calcification theory of Waldeyer. Wenzel favors the opinions expressed by Kolliker and Kollmann, and arrives at the conclusion that the product of the odontoblasts first consists of a transparent, homogenous, reticulated lamella, in which, afterwards, the lime salts are deposited. His exact descriptions serve as a strong support to Kolliker's secretion theory. Leydig mentions a few homogeneous layers, which are said to possess the property of taking up the lime salts which afterwards constitute the basis of the dentine. At last, I wish to mention Heinecke, according to whose observation the formation of dentine is due to the positive calcification of the fibres of the connective tissue (in lower vertebrates).

My own observations have led me to the conclusion that in the explanation of the formation of dentine, as given in the foregoing quotations, there is a hiatus which is the starting point and the cause of all these divergent opinions, and that this arises from the uncertain histologic knowledge of the dentinal germ of the odontoblasts. For five years I have been examining microscopically the human teeth and the teeth of animals, and as a special subject I have selected the structure and function of the dentine cells, and I succeeded during last September in obtaining some preparations by which I think more light can be thrown upon the still dark subject of the formation of dentine.

The preparations to which I now especially refer were obtained from a five-year-old child which had been killed by being run over by a wagon. The original preparation contained six well preserved deciduous teeth in connection with the superior maxilla. First it was placed in concentrated chromic acid for a short time, and afterwards

in alcohol. The embryonic canines and molars were removed by means of bone forceps from their osseous enclosure immediately above and back of the temporary canines. The stringy tooth germ was placed upon an object-glass, a thin layer of its upper surface was sliced off with a sharp Baer's dash knife. This preparation was afterwards dipped into a few drops of carmine and was placed under glycerine upon the microscope. All this was done with the greatest care. The liquid which I am using for the purpose consists of a mixture of a few drops of Beale's and Schweizer-Seidel's carmine, these being mixed with a needle until only a slight, sour odor can be perceived. The preparation is held on the point of a needle in this solution; after washing through distilled water and alcohol it is placed in glycerine. This treatment takes but from one to one and one-half minutes and is sufficient to color the nucleus and protoplasm beautifully.

I succeeded in this manner in obtaining for examination a group of well preserved odontoblasts, a few of which were placed upon the field of the microscope. For enlightenment a few isolated odontoblasts are here presented in Fig. 1, A and B.

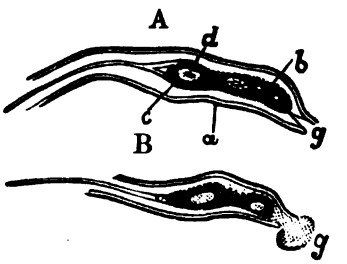

FIG. 1.

The drawing which was made from nature (Hartnack Ohje. 10, Ocul. 2,) is so eloquent that I find it necessary to give only a short explanation. In A and B two numerously granulated odontoblasts are visible; *a*, is a membrane; *b*, is more limpid, finely granulated, slimy protoplasm. In the centre may be noticed the nucleus or rather

a system of nuclei. These nuclei are provided with a fine contour line, and are surrounded by a coarsely granulated protoplasm c, some even show a nucleolus as *d*, others, again, only a granulated contents.

The continuities of this nucleo-cellular system seem to be interrupted by a lengthening into protoplasmic continuations. The outer nucleus or rather nuclear cell, that is, the one nearest the dentine, stretches itself into prolongation, Fig. 2, while the nuclear cell which is nearest the tooth germ appears to send a prolongation through a small opening in the membrane; in B, Fig. 1, this prolongation is absent and the nuclear cell ends here and is round. Around the opening of the membrane will be noticed some protruding protoplasm, which protrusion is caused by an attempt which will be described further on. As these dentine cells differ so much from the drawings and descriptions of the authors quoted, I resolved, in order to avoid any deceptions, to try some experiments. Taps and pressure upon the covering glass have convinced me that we are dealing here with substances which belong together. The membrane *a* did not change its line of contour, but follows the movements of the nucleo-cellular system unmistakably; and while the membrane at its thinner peripheral end did not change its position, the prolongation *f*, Fig. 2, at the last neuclear cell, shows quite an amount of movability. We may consider *a* a membrane filled with protoplasm, which, but for two connective tissue fibers, would also change its position in the same manner as the prolongation *f*. But as this did not take place, the slimy, limpid contents of the cell, *b*, must be regarded as the protoplasm which holds the cell together, and the margin surrounding must be taken to be the cell membrane. In this opinion I am directly in opposition to the mentioned opinions of Waldeyer, Boll, Wenzell and Kollmann, and I also would say, of Hertz, as he does not speak of any cell-membrane in particular.

It is strange that Tomes, contrary to his endorsement of the opinions of the above authors, has copied an illustration from Boll (Fig. 131, "System of Dental Surgery") in which a fragment of dentine shows the odontoblasts surrounded with a double margin, similar to those in figure 2 of my drawing.

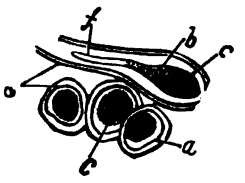

FIG. 2.

The preparation from which this figure was made is from the same specimen as figure 1, with the difference that figure 1 was from a permanent incisor, in a well developed state. (The drawing is somewhat enlarged from the microscopic view.) The cells in this case are of a smaller diameter. Why this is the case will be shortly explained. Having before mentioned it, we will now return to the drawing of Boll, in which we notice nerve fibrils projecting between the dentine cells. For my part, I am inclined to believe that these fibers are the torn remainder of the membrane, though I have examined quite a number of papillæ, and have seen Remack's marrow-holding fibres extend into thin, marrowless fibrils, I did not yet succeed in seeing the network of nerves immediately beneath the odontoblasts, nor the projections from them which are said to enter the dentinal canal and are described by Boll. Prolongation at the peripheral ends of Boll's odontoblasts are wanting, and are therefore torn off. I rather consider these fibres as the membrane, which in a certain stage of its development is closely attached to the original nucleo-cellular system; or, I consider them as the continuation of those odontoblasts which lie nearest to the external layer. Boll, in his opinion, appears to favor the view of Tomes, and his sensitive dentine theory; still, Tomes says in another place, that we have no particular reason to believe in the existence of nerve fibers within the dentinal canals, and that "many animals are endowed with sensation without having any discoverable nervous system; similarly we find in the human body extremely sensitive places, without, however, being able to demonstrate any nerves."

Against these odontoblasts as here illustrated, or rather, as there are facts against their acceptance, there are two objections, namely: that which I am inclined to take for a membrane (see Fig. 1 and 2, a) contrary to the views of Waldeyer, Wenzel, Boll, Kollmann, and

Kolliker, may be nothing more than the granulated margin which has been brought to view by chemical action (W. W. B.), or the sharp contour (H.), or, that it is intersticed, connective tissue. I think it can be easily comprehended that there is no reason why *a* should be considered a granulated margin of the cell, for the reason that such granulated margin is not visible, and I may also add that in the case of *a* the carmine staining has not taken effect; if the granulated margin existed, the staining should have taken place. Concerning the second objection, a person could easily incline to the opinion that *a* is a connective tissue fibre, and, in fact, Fig. 1 would favor such a supposition, but we will see later that it is only in one of the stages of development. And still, when looking at Fig. 2, where we notice the dentine cells divided through their centre, and enclosed by a circular margin, the granular protoplasm appears, and we are led to suppose that there must be a membrane present. Furthermore, the authors named furnish an important fact by denying the existence of any connective tissue fibres. Hertz makes no exception in this particular, as by the term intercellular substance he does not understand an organized tissue, but a slimy and gelatinous, changeable substance. It is altogether different with the intercellular substance of other authors, such as Henle, Schwann, Owen, Leydig. (Heinecke?) Nevertheless, if their opinions are compared, we will find that while Henle and Schwann find a (tolerably isolated) fibrous structure in the already formed dentine, Leydig and Heinecke speak of the connective tissue, not as being between but behind the odontoblasts and upon the papillæ. In the literature spoken of, Hannover's examinations are the only ones in which the odontoblasts are described as having a membrane. He speaks in this connection of an intercellular substance, and in the absence of any drawing, I am not positive whether, according to Hannover's observations, this membrane is the same that I have the honor to introduce here; at any rate, authors in citing from him, do not speak of it in that sense. I, for my part, agree with the others in reference to absence of connective tissue, as in many preparations from calves, pigs, dogs, etc., and even on human embryos I could not discover any connective tissue in these places.

The connective tissue, in my observation, crossed itself behind the odontoblasts in irregular bundles. If we carefully examine, un-

der the microscope, a lamella of tolerably well developed embryonic dentine, together with its dentine cells hanging upon it, we will find that these cells, which are arranged in a crowded row, are surrounded by a distinct contour, which exactly coincides with the line of the intertubular substance, and differs from it by its greater resistance to color. The same was noticed by Kollmann.

If the lamella remains in connection with the upper part of the papillæ, it is not very difficult to observe in a good section that the fibrous oral lumps of protoplasm are imbedded in suitable hollow places, which show a light area around them. Still more convincing are those specimens, where in consequence of mechanical disturbance, the protoplasmic lumps have been pendant. The former is the universally acknowledged dentine cell, but the latter would be the cell membrane, the existence of which has been denied. This opinion is directly opposed to most of those of the cited authors. This fact may probably be explained by the statement that in consequence of the least pressure or stretching, the dentine cells escape from their slippery frame and the protoplasmic lumps follow the dentine fragments, and the resisting processes of the protoplasmic lumps are fixed in the canals of the dentine fragments. This is the reason why, as a rule, upon such fragments we find perfectly naked, free, odontoblasts, which not infrequently appear to be robbed of their nerves by having them torn off.

In reference to the origin of the prolongations—dentinal fibrils—I have observed that these constitute the direct continuation of the protoplasm of the nuclear cells which has been consolidated and drawn into fibers. Concerning the nuclear cells, it may be alternatively said that they either originate by multiplying cell formation, or that they originate from the protoplasmic fusion of embryonic, but peculiarly formed, round, connective tissue cells. I adopt the latter as my view. A good proof can be found in Fig. 1, A, where it will be noticed that the last concentrically lying, nuclear cell, sends a short continuation into the opening of the dentine cell, or rather, into its membrane, which shows very clearly that its origin is from the round cell of the papilla. These round cells group themselves in an early embryonic state, into cell-pillars, first numerous and double, and at last in singular cell-rows. In agreement with Hertz, I also think that the origin of the odontoblasts is from this

fusion; while the fibrils—tooth-fibres—take their commencement from the periphery of the last nuclear cell.

But here I must remark that contrary to Hertz, I could not see in this place the sharp margin of the protoplasm described by him, the continuance of which he considers as the fibrils. The disappearance of the nuclei takes place during the formation of the dentine fibrils. This may be explained to be the solving of the nuclei by the surrounding protoplasm. Nevertheless, in the case of nearly formed teeth there can be noticed occasionally upon the inner upper surface of the dentine, a few singly, nucleated, crumpled cells. According to this, I think the object and aim of the odontoblasts to be the following: The gelatinous protoplasm within the membrane is almost used up by the precipitation of lime salts for the building up of the dentine, and this process begins at the periphery, the cells at this point becoming gradually smaller. The dentine receives its solid substance exclusively from the slimy, or according to Waldeyer, from the gelatinous protoplasm of the odontoblasts; while the nuclear cells have the object of furnishing the dentinal fibrils—tooth fibers. It is, however, possible, that a portion of the protoplasm of the nuclear cells to a certain extent assists in the construction of the walls of the canals. The most difficult question to answer remains, namely, whether in figure 1, we are dealing with a true cell membrane or not?

It is true that our histological knowledge of membrane cells directly contradicts the existence of a membrane where both poles show an aperture without the well-known bridge-like crossing. And I acknowledge that I cannot otherwise clear this point, than by referring to Fig. 2, where the elements of the tissue agree with histology. It can here be seen, that a ring with a double contour encloses the granulated protoplasm; furthermore, that the crumpled or partly fallen out protoplasm makes this appearance still more prominent. In consideration of these circumstances, I believe no one would doubt that the odontoblasts are membranic cells. Nevertheless, set the case that I am wrong, the unanswered question still remains: what causes the contour lines in both figures?

In this case it could not be otherwise answered, but that it is intercellular substance, but still a glance at Fig. 2 would immediately show the improbability of such an assertion. What now remains to

answer is, in what manner these facts should be explained? Facts, I call them, as the foregoing figures are true copies of the forms seen under the microscope.

The examinations of my microscopical preparations have led me, as I think, to a satisfactory explanation, which I ask you to permit me here shortly to give.

The two figures represent different stages of development. Fig. 1 is a younger, Fig. 2, a (several months) older specimen. Careful examination of a great number of preparations has brought me to the conclusion that the membranes of the odontoblasts close their posterior apertures as development advances, and that it (the membrane) moves nearer towards the center of the protoplasm (or nuclear cells) until at last, in almost fully formed dentine, it lies close to the remaining protoplasm (or, if the nucleus exists, to the nuclear cell). I say when the nucleus still exists as the latter appears in some examples, so used up by the formation of the fibrils, that on the fibril there is but a small cylinder of protoplasm observable. To avoid a misunderstanding, let me add that the last words refer to the uncertainty of the gradual consumption of the cells and their nuclei.

Let us at last consider the process of calcification.

By all probability the membrane is first attacked and hardened by deposition of lime-salts; this then serves, so to say, as a preformative wall for the deposition of lime-molecules from the protoplasm within the membrane. In this manner, I think, appears first, the intertubular substance, and afterwards the walls of the dentinal canals. In young, embryonic preparations, the perfect continuity of the membrane with the intertubular substance, can be observed, while the nearest lying protoplasm falls into a line with the neighboring dentine fibrils; the fusion of these elements into each other, however, prevents a clear distinction. This conclusion is supported by the regular parallel appearance of the dentine canals, which could hardly be possible, if, according to Waldeyer, a diffused deposition of lime, which takes place, would leave a portion of the protoplasm in its center uncalcified, in order to form the fibrils. Concerning the theory of the deposition of lime-salts in the protoplasm, I find that the experiment with the white of eggs, mentioned by Tomes, is appropriate to give a good explanation.

ALVEOLAR PERIDONTITIS—PARTIAL LOSS AND RESTORATION OF THE ALVEOLAR PROCESS.

By JOHN S. SMITH, D. D. S., Lancaster, Pa.

The following is the history and treatment of a case of alveolar peridontitis:

Miss W———, aged 26, medium height, stout body, fat, brown hair, blue eyes, sallow complexion, school teacher by profession, comes for treatment.

Took medicines occasionally for several years, the appearance of the skin of the face indicating impurity of the blood. Her mother lost her teeth at an early age from resorption of the alveolar processes. The patient had noticed the recession of the gums about her teeth for some years back. She was advised by her dentist several years ago to have them extracted. In the summer of 1879 she had an appointment for their removal. In consequence of the illness of the dentist the operation was postponed.

HABITS OF LIFE.

Habits sedentary, temperate, her occupation allowing but little recreation and requiring close application both in and out of school. Generally partakes of the same food as the other members of the family do. Appetite usually good. Never took mercurial medicines to the best of her knowledge.

PRESENT APPEARANCE.

April 20th, 1880. The anterior teeth of the upper jaw are spread laterally—at least two lines of space between them. The gums upon the facial and lingual aspects have receded at least three lines. Between the teeth these spaces are completely filled with hypertrophed gum tissue, reaching well up the crown. The gums are deep red in color, hot and tender to the touch, and bleed freely when pressed. A viscid, purulent fluid escapes from beneath the elongated gums; every morning she finds her teeth bathed in the discharge. Her breath is offensive and her mouth has a bad taste. She suffers most pain from the gums adjacent to the superior lateral incisors, these teeth being quite loose and the alveolar processes nearly all resorbed.

She has difficulty in masticating and suffers much upon occlusion of the teeth. This caused her to seek surgical aid.

The teeth are all present, with the exception of the sixth year molars. They are of good texture, belonging to the "dense yellow group," free from caries, with the exception of the fissures in the upper and lower molars.

The alveoli and gums of these teeth are healthy. A flat probe can be passed under the gums of all the remaining teeth at least one-third towards the apex of the roots. The laterals on upper jaw are nearly denuded and probe can be passed two-thirds up and entirely around the roots.

LOCAL TREATMENT.

Complete removal of all abnormal gum-tissue from between the teeth. This operation was performed at three distinct sittings.

Bled freely from cut surfaces. As the outgrowths were very vascular, applied tannic acid as an astringent to the bleeding parts.

The following wash ordered to be used four or five times daily for one week:

℞. Potassa chlo.....3j;
Tinct. catechu.....fl. ℥ss;
Aqua pura.....fl. ℥iv. M.

Patient returned after one week. The gums looked much better, and mouth more comfortable. She can now masticate upon all her teeth except the two lateral incisors, these continue sore; gums around these teeth much conjested, of a purplish red color; at the edges, bright red. The discharge from between and around the teeth continues.

We now select a thin, flat, steel instrument, bent slightly at the point, with rounded corners, and pass it gently up as far as it will go along side the roots. Can pass up under the gum towards the ends of the lateral incisors, nearly to the apex. A careful search is here made for tartar. (Salivary calculus.) Can bring none away; the roots feel comparatively smooth, with the exception of here and there a granular substance, not unlike soft tartar, or the green stain that is seen on the labial surfaces of the incisors. The instrument is carried up under the gums and around all the affected teeth in the same manner, but no where else was the same substance met

with. Around the centrals, bicuspids and canines the deposit is more like calculus, harder and more brittle, with rough spiculæ here and there projecting from surface of roots. This deposit, however, is not found higher up than about three lines from the necks of the teeth.

All deposit is thoroughly removed and the parts well burnished, (using the engine for this purpose) finishing with soap, followed by washing with tepid water. This should always be observed, as the soap, if allowed to remain, will cause foreign substances to adhere. This occupied three sittings of an hour and a half each. Up to this time no topical dressings except iodine and carbolic acid around the laterals, has been employed. Zinc chloride, as a dressing is now applied around all the teeth daily for one week. I have used this remedy in similar cases since 1873.

I am indebted to Dr. Henry S. Chase for the following formula:

℞. Chlroride of zinc, grs.....60
Blood root " 15

Grind the crystals with the powder, without water, until moisture enough from the atmosphere has been absorbed to make a thick paste.

This paste is easily applied with the instrument described and will remain unless removed by water or saliva.

At the end of this time the discharge from gums is notably lessened, the bad taste in the mouth considerably diminished, the gums look better, patient much encouraged. The laterals are improving under this treatment, the gums around them assuming a more healthy aspect. Treatment continued, applications being made at intervals of three days. At the end of second week the probe cannot be passed up half the former distance. The teeth are growing firmer, except the laterals; they are still loose. At the end of second week no discharge. Treatment continued every third day, with the addition of tannin, applied to the gums every other day.

At the end of the third week the gums all look healthy, except at the free edges around the laterals. The probe meets with some resistance when passed up around these teeth.

Treatment continued up to June 23, applications being made at longer intervals. At this date the teeth are all firm in their sockets, except the laterals; these teeth are not firm, but are very much

improved. Patient dismissed, but will keep a close watch over the lateral incisors. It will be remembered that these teeth were giving the most pain. So far this has been controlled and subsequent treatment will be directed to the restoration of the bony sockets. The case has been one of much interest and the result is highly satisfactory to all parties concerned.

"THE ADVOCATES OF THE NEW DEPARTURE CANNOT MAKE FIRST-CLASS GOLD FILLINGS."

BY J. FOSTER FLAGG, D. D. S.

In almost every discussion upon the question of Plastics vs. Gold, for filling teeth, this assertion—whether it be true or not—is made with the evident idea that it is an argument.

It is earnestly hoped that the object and tendency of the New Departure movement is now understood by thousands of dentists, as having a bearing which is not touched by such remarks as this; and yet, in the recognition that the movement is by no means fully comprehended, I feel it my duty to offer a few comments upon this point.

I wish, first, to state that the question of ability or inability to make "first-class" gold fillings, on the part of the advocates of the practice of filling with "plastics," has absolutely nothing whatever to do with the principles promulgated.

In our recent papers we refer, in discussion, only to such results from gold as we say pertain to the practice of the *very best* manipulators in that filling material.

We, of the New Departure, do not *now* discuss our individual work with gold. We did *at first*, because it was deemed necessary that we should begin "at home," but it was, in our first effort, very distinctively intimated that we did not intend that our campaign should be one of defense and apology for our own short-comings alone, but that it was to be immediately aggressive—that we were on the attack—and that the strongest of the strongholds were to be made the objects of our assaults. What does it matter to us that our opponents *can* make first-class fillings with gold? What

would it advantage them even if we could not do such work?—we think, clearly nothing, in either case.

We claim that it is a *fact* that the work of those whose recognition as "first-class" men, depends solely upon their ability to introduce a "first-class" gold filling, does not save the teeth that are hard to save.

We assert that we save these teeth *better* with "plastics" than they do with gold, and our patients' mouths vouch for the correctness of our assertions.

Even if we could not fill such teeth well with gold, why should we desire to? If we can beat them very much in our way, and with our materials, why should we aim to equal them in theirs?

These are certainly questions worthy of thought. As we regard the ability to make exquisitely elegant gold fillings in places where this kind of work has been tried over and over, and found unequal to the emergency, as anything but "respectable," why should we aim to excel in that direction?

As we regard "dentistry" as the "science of saving teeth," and *not* as the "science of packing gold," why should we expend our energy in the same channel where so much of theirs has already been proved to have been wasted? Their loss of teeth has proved this.

It is useless to talk now of *not having lost them*, for the mouths, which contained frail teeth of soft tissue, and which for thirty years have been under "first-class" dentistry, are largely *toothless*, and, at best, are only able to show arches which are dreadfully broken.

This is what has to be "talked to" by the opponents of the new departure, and not the question as to whether the advocates of this movement can or cannot make good gold fillings.

We concede to the "first-class" gold fillers the ability to make first-class gold fillings, but we contend that they *cannot save teeth*; that is, the class of teeth in which *their fillings* last for but two, four or six years; and we claim, for ourselves, the ability to *save just such teeth* with "plastic" fillings *even if it be true* that we are "not able to make first-class gold fillings!"

I wish to impress upon the "coming men" of dentistry, that with *gold* for their reliance in soft teeth and in inaccessible places, every failure gives them an increasedly difficult task to perform, and I

wish also to impress the fact that the ratio of increase of difficulty is simply immense!

I wish them also to note that the grandest of the gold men are *driven* from trench to trench until they are *made to choose* between "plastics" and forceps!

What a position for a "grand man" to occupy!—and yet, how constantly do they occupy it! and, how often, again, do they resort to the forceps rather than employ the "plastics," and thus ruthlessly sacrifice many a tooth which an equally "first-class" plastic filler would save for years of comparative usefulness, by a comfortable, inexpensive operation, which would be alike easy of accomplishment, both to him and to his patient.

I wish it also to be remembered that this can be done *after* the gold men have done their best, and failed to save the teeth! For these reasons it seems to me as though some thinking of a deeper kind than the mere ability of *any one* to make gold fillings, might be indulged in advantageously. And at the same time I would suggest that calm, careful investigation as to *the ability of the advocates of the New Departure to save teeth* might possibly soon be productive of much progress in dentistry, and necessarily eventuate in a more general appreciation of the humane strength of our persistent war-cry—"Tooth-salvation!"

ORAL SURGERY.

FISTULA OF STENO'S DUCT FOLLOWING GUNSHOT WOUND.

On the afternoon of September 8, 1870, I was summoned out of the city to see a boy fifteen years of age, who, a few hours before, had been wounded by the accidental discharge of his gun, which was loaded with duck shot. He was in the attitude of leaning over the barrel at the time the discharge took place. I found a large lacerated wound of the right cheek, which freely communicated with the mouth, and extended from the zygoma to the symphysis of the jaw. The lower jaw was fractured transversely just below its neck, and the ramus considerably comminuted as far as its angle. Several of the teeth had been removed, while the tongue was but

slightly wounded. The inferior dental nerve was exposed for an inch or more in its course and presented a ragged appearance. Hemorrhage had been quite profuse, but was arrested by Dr. Jay, who, fortunately, was in the vicinity at the time of the accident. The patient had suffered from severe shock, but reaction was being established when I reached him. Several fragments of bone which were displaced and attached by a mere thread of periosteum required to be removed; this was done with as little disturbance of the periosteum as possible, and the exposed and torn portion of the inferior nerve removed close to its emergence from the bone. The other portions of the wound were carefully cleaned and the wound communicating with the mouth was approximated by strips of adhesive plaster, and dressed with picked lint wet in a solution of carbolic acid and glycerine (1 to 20). Under the care of Drs. John C. Jay and Lounsberry everything progressed favorably, and the next time I saw the patient was in my office, Oct. 11. The wound of the cheek had all closed save a small opening which communicated with the mouth and readily allowed the passage of a probe, and through which some saliva was flowing. There was considerable consolidation of the jaw at this time and the patient could open his mouth for the space of an inch; though when this was done, or when he laughed, the jaw would deviate to the left of the median line. Fearing that unpleasant contraction of the soft parts would result if remedial measures were not now employed, and the jaw appearing sufficiently firm, I ordered that the mouth be frequently opened as wide as possible, and he begin to take solid food, chewing upon the left side, he having, up to this period, been living upon fluids; at the same time the soft parts on the affected side be frequently stretched by the introduction of the finger into the mouth. Had not this plan been pursued, I fear that the fracture which had occurred in the vicinity of the tempora-maxillary articulation would have led to anchylosis, whereas, by this line of practice, we were enabled to secure a false joint just below the point where the ramus joins the neck.

His next visit was on October 21, when I found that he had gained considerably as to the movement of the jaw. A small piece of detached bone was at this time removed from the direction of the symphysis. He complained considerably of saliva escaping from

the wound on the check while eating. Application of the nitrate of silver was at this time made to the fistula.

From this date he progressed very favorably in every respect, there being greater freedom in the mobility of the jaw and less trouble from the saliva flowing down the cheek. When, on the 29th of November, I was called to see him, he informed me that he thought he had taken cold a few days before, and was suffering from a swelling just behind the lobe of the ear. There being evidence of suppuration at this point, it was opened and the cause of the trouble found to depend upon a piece of necrosed bone, which was removed, and from this he recovered in a few days. Nitrate of silver was again applied to the fistula, which, however, seemed to give but slight annoyance.

The flow of saliva from the fistula, however, eventually increased, and became a source of great trouble, and, when I saw him again in September, 1871, there were two openings from which saliva trickled and produced some excoriation of the face. These openings were but a few lines apart, and seemed to be a little below the site of Steno's duct, though the location was close to the spot where the duct enters the mouth—as was readily determined by a very fine probe which could be made to enter the canal from within the mouth. This probe could be only passed just within the orifice, where it met with obstruction. These fistulæ were situated in a tract of cicatricial tissue. His condition was now such that some radical steps were necessary for the relief of this distressing feature in the case, and he, as well as his friends, were anxious for something to be done to change the course of the saliva. In conversation at this time with Dr. James R. Wood, in reference to the treatment of this variety of fistula, he related two cases wherein he had been successful in cutting down upon the duct at the site of fistula and turning it into the mouth. In considering the various features of my case, I preferred this to the one of using the seton, so disagreeable had it proved in two cases where I had seen it employed in the hands of others. Another reason was, that I feared that the presence of the seton in this case, passing as it would have to through feeble cicatricial tissue, might lead to sloughing.

On the 24th of February, 1871, assisted by Dr. Jay, I proceeded to cut down upon Steno's duct, which fortunately was readily found

by laying open the fistulous tracks, and, with a fine probe as a guide, I then dissected out the cicatricial tissue around the fistula, freed the extremity of the duct, and turned it in through an opening into the mouth. The external wound was then brought together by wire sutures. The upper portion of the wound healed at once very kindly, though at the lower portion there was some suppuration, and I feared the result of the operation, as, on the fourth day, a drop or two of what I took to be saliva, tinged with blood, trickled from the lower portion of the wound. Suppuration, however, soon ceased, and the wound healed, leaving my patient free from salivary fistula.

At the time of the operation I did not know that I was putting in practice the means suggested and adopted by Langenbęck in the treatment of these fistula.

Where this operation is feasible, I think it is one that commends itself to the favorable attention of the surgeon, though in many cases no doubt a more simple form of procedure may obtain a cure. I have never had the opportunity of again testing this method, but should not hesitate to do so in a case where sufficient healthy duct could be obtained and where cicatricial tissue would militate against other methods, or, what I should prefer in some cases, the cutting out of the fistula by means of a punch, and closing the external wound by suture, as suggested by the late Dr. Horner; which, to my mind, is a better method than by seton, being devoid of its disagreeable features. I am well aware, both from the literature of this subject and personal experience, that very many cases of fistula of the parotid or its duct that come under our care as the result of wounds, may be induced to heal by the use of such simple methods as the application of the hot wire or the nitrate of silver associated with compresses, and in some instances by the introduction of probes through the canal; while some cases have healed spontaneously after a shorter or longer interval. The case of Col. Guiney, on page 339 of the "Surgical History of the War," part first, is a striking example of the spontaneous closure of fistula of Steno's duct following gunshot wound, which took place one year after the receipt of injury.

In this connection, the following case of fistula of the parotid gland, resulting from a pistol-shot wound, recently under my care, is an example:

W. D., aged 22, was admitted into Roosevelt Hospital, December 31, 1879, who, shortly before admission, received a pistol-shot wound in the right cheek, his assailant being about seven feet distant; the ball entering about one and a half inches behind, and three-quarters of an inch above the angle of the mouth, passing in a direction backward and slightly outward, to a point two inches behind and on a level with the lobe of the ear, at which site the ball was extracted. It passed through the masseter muscle, and, though grazing the bone, produced no fracture. A drainage-tube was introduced through the wound, and the parts syringed with a solution of carbolic acid. On January 4th saliva began to dribble from the posterior wound, though it also entered the mouth through its natural channel. The flow of saliva through the posterior wound was quite steady, and at times so profuse as to soak the dressings and trickle down the neck. The discharge began to abate on the 16th of the month, and on the 26th it had ceased, and the tube was entirely removed; the wound closed, and the patient was discharged cured, January 31.

During the late war, it would appear ("Surgical History of the Rebellion") that but few cases of salivary fistula were met with, though the records of wounds of the face are numerous; the methods adopted for their relief being those of occlusion, cauterization, and frequent dilatation of the excretory orifice of the canal of Steno. The reason of fistula not being more frequently met with after gunshot wounds, was supposed to be due to the laceration produced by the projectile usually sufficing to obliterate the salivary ducts.

The variety of methods that have been put in practice for the cure of salivary fistula, proves how difficult the management of some cases have been.

Cauterization, compression, and ligature of the duct for the purpose of causing atrophy of the gland, as proposed by Viborg; his experiments upon animals toward the close of the last century proving to him that there was no danger in the procedure, were among the earlier methods adopted.

Then follows the mode by seton, which has been varied greatly in its application. Either passed through the natural duct for the purpose of dilatation, or else passed through the mouth by means of a trocar through the fistulous opening, or through a perforation made

by the hot iron or an awl; all these modes seeking to create a new channel for the saliva.

The idea of dilating the duct appears to belong to Morand and Louis, who introduced a fine thread guided by a probe into the natural orifice of the duct, and withdrew it through the wound; this seton was gradually increased in size. When the saliva passed freely into the mouth, and when the ulcer had contracted to the periphery of the seton, the foreign body was then removed, the ulcer touched with astringents, and compress applied till it closed.

By the other method, when a communication with the mouth has been well established, and saliva flowing in the proper direction, the seton being withdrawn, the extended edges of the fistula are found and brought together by suture.

In place of the old method of dilating the duct by means of silk threads, as practiced by Morand and Louis, or by catgut and leaden wires maintained in the canal, as employed by others; the introduction of fine silver probes used at varying intervals has been substituted with pleasing success. Mr. Francis Mason, in his work on the "Surgery of the Face," cites an interesting case of cure brought about by passing a probe through the mouth, so as to emerge from the fistulous aperture in the cheek; then, having bent the instrument slightly as it was pushed along the duct as far as possible, toward the gland. It was left in this position for the space of eight hours, and the operation again repeated after three days. After the first introduction of the probe, saliva ceased to flow from the opening in the cheek. In some cases we fear it might be no easy matter to pass a probe in this manner through the upper opening of the duct, though its prompt success in this case merits a further trial.

Mr. Pick, in the "Lancet" for February 10, 1870, relates the following interesting case

A girl 20 years of age was admitted into St. George's hospital for a salivary fistula, which she had had from childhood, the result of abscess. It was a source of great annoyance from the constant dribbling of saliva. An attempt to pass a small probe down the canal to ascertain if an opening existed into the mouth, was made. By using slight force, he succeeded in passing the instrument a short distance, perhaps half an inch, but no further. On account of the size of the probe, he abandoned the operation till a finer one could

be procured. The following morning no saliva flowed from the fistula; her pillow, which formerly had been wet, was found dry; and she had lost the dryness of her mouth, from which she had greatly complained. She was under observation for a week or ten days, during which time she remained well.

Mr. Pick justly remarks that this case illustrates how recovery may sometimes take place in cases which at times are most intractable and difficult to cure. The result of this probing was no doubt sufficient to remove some obstacle, probably a small calculus, which had prevented a spontaneous closure of the fistula, hence the rapidly effected cure.

A salivary fistula may arise from so many causes, and present various features and sources of location, be it situated in the course of Steno's duct, or of the ducts in the gland itself, or as it arises from sloughing, the result of ptyalism, or follows gunshot or incised wounds, each case may demand separate study and varied modes of procedure. Yet, from the remarks on treatment in most of our textbooks on surgery, one might be led to believe that seton was the only and all-sufficient method in dealing with these cases, many of which have been found quite intractable.

Perhaps of all the operations thus far resorted to, the one which would seem applicable to many cases, which is simple in its procedure, and devoid of the unpleasantness necessarily attached to the seton, is the one devised by our countryman, Dr. Wm. E. Horner, of Philadelphia. It not only proved successful in his hands, but in those of others. Dr. Henry H. Smith, in his work on "Operative Surgery," states he has operated by this method on two patients with perfect success, the external parts healing by the first intention.

The operation is thus described: The patient being seated, with the head well supported by an assistant, a strong, broad, wooden spatula is introduced within the cheek of the affected side; this is held firmly by the assistant. The wound being then slightly elongated by incising its sides in the line of the zygomaticus major muscle, a round punch, like that used by saddlers, should be placed over the fistulous orifice, care being taken to avoid the anterior edge of the masseter muscle. Then, on pressing the punch firmly against the spatula within the mouth, a piece of the entire thickness of the cheek will be removed, and a fresh opening made directly into the

mouth. The external wound, being accurately closed by sutures and adhesive strips, will usually heal kindly, and the internal opening be found to give free vent to the saliva.—[ERSKINE MASON, in *The American Journal of Medical Sciences.*

REPAIRING RUBBER PLATES; METALLIC, INSTEAD OF WAX BASE PLATE.

BY S. ARTHUR GARBER, D. D. S., Tipton, Iowa.

When the plate is broken entirely apart, fasten together with wax, invert, and run plaster upon the palatal surface, making a perfect model; when plaster is well set, carefully remove each piece from this model, and with a jeweler's saw or a file cut away one-fourth inch along each side of the fracture, and make dovetail cuts at intervals, transversely to the break, with burring engine or lathe circular saw; cut a groove half through the plate from front to posterior border, as close to the molar teeth as new rubber is to go; chisel, bur and scrape out old rubber to same depth as groove is cut; replace each piece firmly on the model, and instead of waxing up in the usual way, take heavy *tinfoil* or tea-chest sheet lead (which is cheaper), and cut of the latter from five to eight or more thicknesses—according to the case—in width, and length sufficient to cover the surface designed to be occupied by new material. Lay on and burnish down and run a little wax all around the edge of this metal base plate to fasten it to the broken plate. Thus prepared, it is ready for the flask. When the upper section of flask is taken off the sheet lead can be easily and quickly removed. As there is no wax in the grooves or counter-sinks, it is clean and ready for immediate packing. Before replacing upper section of flask, scrape off all lumps or irregularities from the surface of plaster, making it perfectly smooth. Plates that are only partly broken apart can be scraped, counter-sunk and same kind of base plate used as described. By this method much time, both in the preparation and final finishing of the case, can be saved. In the former kind of breaks an entirely new and solid piece of rubber takes the place of the fracture.

PROCEEDINGS OF DENTAL SOCIETIES.

TWENTIETH ANNUAL SESSION OF THE AMERICAN DENTAL ASSOCIATION.

FOURTH SECTION—OPERATIVE DENTISTRY.

[Continued from page 473, October Number.]

The chairman of this section, Dr. G. W. Keely, being absent, the report of the section was presented by Dr. E. T. Darby, of Philadelphia. He stated that the section had but one paper to present. It was written by Dr. J. J. R. Patrick, of Illinois, who is not a member of the association, but the paper had been examined by the censors, and that committee had decided that it should be read before the association. The report also stated that replantation and transplantation were subjects deserving the attention of the association, and that one practitioner had reported sixteen cases, fourteen or fifteen of which were successful.

The section would also call attention to an improvement in cement fillings by the introduction of several preparations of zinc phosphate. In the improved forms of gold, platinized gold was regarded as the most important.

Dr. Darby then introduced Dr. Joshua Tucker, of Boston, who addressed the association on the working properties of soft gold foil.

Dr. Tucker, who was received with applause, said that he was now more than ever confirmed in the belief, that the old method of filling teeth with soft gold was the best. He condemned the use of cohesive gold and the mallet, when first introduced, and subsequent observation had tended to strengthen that opinion. He maintained that the principle was wrong; and that the packing of cohesive gold solidly against the walls of the cavity, dammed up the orifices of the dentinal tubes, and thus prevented the escape of the natural exudations. The result was that in three or four years the teeth turned blue, as the result of acrid accumulation back of the gold, and that decay recommenced at this point internally, and not at the margin of the cavity. By the old method with soft gold, the packing of the gold solidly against the walls of the cavity was carefully avoided. The gold was first packed equally into all parts of the

cavity, and afterwards condensed only on the surface; this condensing of the surface being sufficient to prevent the ingress of fluids, and thus preventing future decay. The use of the mallet condensed the gold throughout, and thus dammed up the tubuli. This was the error in modern methods.

The paper on

ORAL ELECTRICITY AND THE NEW DEPARTURE,

By Dr. Patrick, was then read by the secretary. Following is an abstract of the paper:

"At the last annual meeting of this association I had the honor of reading a paper entitled 'Dental Fallacies,' and although the present paper bears the title of 'Oral Electricity and the New Departure,' I consider it in the nature of a continuation of the former paper. * * * The frequent failures in filling teeth with gold by the most conscientious operators—men who spare no pains to perform their work to the utmost of their ability—are too apt to lead them to seek the cause of failure outside of themselves, for no man who honestly does his utmost is willing to suspect a lack of manipulative skill as the cause of his failures. * * * There are other causes that have been equally as fruitful as defective manipulation in creating a belief in the superiority of plastic filling: (1) The continual appeals on the part of patients for inexpensive work. (2) The ease to the patient and operator in the use of plastic materials. (3) The more profitable employment, in a monetary point of view, to the operator. (4) The deep interest shown by the champions and promulgators of this old style system revived, of saving teeth, in putting compounds of their own manufacture upon the market."

The writer here quoted from Professor Flagg's pamphlet on the basal principles of the "New Departure," and criticised the arguments of Flagg and others, and the published experiments of Dr. Chase. He said that if teeth were safer in the hands of a majority of the recent graduates of dental schools, when filled with some plastic material than when filled with gold, as Dr. Flagg confidently asserted, he would say so much the worse for the schools; and contended that a dentist who could not fill teeth well with gold, should not be allowed to practice. He said:

"In the selection of filling materials, to secure a good result, it

is indispensable that the material used should fit the walls of the cavity perfectly, and that it should exclude completely all those external agencies which induce decay; that it should be solid and undivided in all its parts, fitting it to resist all pressure likely to be brought to bear against it; and, finally, that it should resist to the fullest extent chemical action, thermal influence, and attrition. So long as we are confined to the use of metals for filling materials, there is no metal or combination of metals or substances that has yet been found that can take the place of gold for the purpose. It possesses more of the valuable properties of the force of cohesion than any other agent; it is capable of receiving and retaining additional powers of cohesion by the application of coercive force; its hardness and elasticity are greatly enhanced by its sister metal, platinum; its adhesive properties are superior to the cohesive properties of most other metals—in fact, its power of adhesion is such that in ordinary temperature it will unite under the influence of coercive force almost equal to iron or platinum under heat. Like platinum, it is not influenced by any single acid or alkali; does not tarnish in moist or dry atmosphere at any temperature, and is not affected by sulphur, iodine or phosphorus."

He held that the term battery was not applicable to any arrangement of substances that was practicable in the mouth, and denied the existence or possibility of electric currents, except where tin and silver were opposite each other, and the surfaces of both metals being subject to the action of an acid fluid of the mouth, would, when brought into contact, produce a feeble electric current. He regarded silver and mercury as unsuitable metals for filling teeth, by reason of their affinity of sulphur, which abounded in the animal body.

RECAPITULATION.

"In recapitulating some of the observations recorded in this essay, I desire to call attention to the following propositions: A voltaic battery cannot exist, excepting in the manner directed by Prof. Volta, the inventor or discoverer. It consists of an equal number of pieces of zinc, silver and pasteboard; the pasteboard pieces soaked in a solution of chloride of sodium, and then with the metals are piled in the following manner: zinc, silver, pasteboard, and

so on in the same order, the uppermost plate being of silver, and the undermost plate of zinc. These exterior plates, to each of which a wire is attached, form the terminals or poles of the pile. This was the first of those instruments now so well known by the general term, 'galvanic battery.' The construction of batteries for the generation of electricity are various and peculiar, both in regard to the material used and the arrangement—thus we have a Smee's, a Grove's and a Daniell's battery, each bearing the name of the inventor; and when 'dentos and gold' shall be proven to form an electrical combination and be proven to be a battery, *it* may also bear the name of the inventor.

"If vapor rises from mercury at the freezing point of water in sufficient quantity to whiten gold leaf, an amalgam filling subjected to the heat of the human body (98° F.) must gradually part with its mercury by vaporization; this can be demonstrated by selecting a few old amalgam fillings, and after accurately weighing them, submit them to a heat sufficient to evaporate mercury; this being done, again weigh, when the mass will be found to weigh as much as it did before heating. As a further test of the divisibility of mercury under the influence of heat, take 100 parts of Fletcher's alloy, add 60 parts by weight of mercury, and allow the mass to harden, then submit it to a sufficient heat to vaporize the mercury and weigh the residue, and there will be found 100 parts minus the mercury. Fillings of amalgam taken from the mouth after being in use one or two years and subjected to the same influences will yield a little mercury; enough to whiten gold leaf, but not enough to reduce the mass ten per cent in weight.

"When an individual, either by bad counsel or a false economy, has been subjected to mercurial or amalgam treatment for diseased teeth, we find that fifty parts of the mercury out of the sixty used in forming the amalgam are vaporized by the heat of the body in a few years and taken into the system in small, but regular quantities, —the most potent manner of administering mercury for constitutional effect. Should not this be sufficient to induce every conscientious practitioner to discard all amalgams from the list of filling materials, and be the means of inducing others to be less presumptuous in their speculations, and more honorable and resolute in their practice?"

DR. ATKINSON said that in his opinion the censors who had inflicted the reading of this paper upon the American Dental Association, needed to go to school. It was abominable for a man who claimed to know something of natural philosophy, to go on with the wretched drivel, misconception and misstatement the association had just listened to. Whoever the miserable wretch was that had written the paper was of the old fogy stamp, and had hidden under a mass of words, a little information that could have been given in two minutes. He said that the idea that fifty or sixty parts of the mercury contained in an amalgam filling could be absorbed into the system to its injury was absurd; for the mercury could do no harm until it entered into some new chemical combination.

PROF. BUCKINGHAM objected to Dr. Atkinson's method of discussing this paper, and contended that the paper was worthy of discussion. He held that electricity may exist in the mouth, but whether it was the cause or the product of decay was yet undetermined. The working of a battery is not easily explained, and probably not one man in a thousand comprehends it in its simplest form. Electricity resulting from the incompatibility of metals with tooth substance, is a question of difficult solution, and an attempt at its discussion should not be met as this paper has been met here.

DR. ATKINSON claimed that we ought to discriminate between the things that we fancy and the things that we know. What he objected to was not the study of science, but that incompetent men should attempt such investigations and bring their crudities before this body. He had a right to speak of the paper as he had done.

The principal phase of decay is that of chemical decomposition, which is merely a retrogression—a return to the embryonic state.

Mercury is inert and cannot be injurious unless it enters into combination with some other substance. Only two compounds of mercury are known to be deleterious to the animal body, and these are not formed in the mouth.

DR. BUCKINGHAM believes that if the vitality of the teeth is destroyed, they are robbed of the protective power which vitality exercises over them. He said Dr. Atkinson had not explained the process by which decay destroys dental tissues, and added that the two compounds of mercury spoken of, were both composed of chlorine

and mercury, one having one atom of chlorine and two of mercury, and the other having equal atoms of *each*, chlorine and mercury. One is very poisonous, the other nearly inert. Poisons depend upon the proportions in which their component elements are combined. The same elements combined in other proportions are harmless, and in many cases nutritious.

DR. W. W. ALLPORT agreed with Dr. Tucker in his remarks on the use of soft gold. He had long been opposed to the exclusive use of cohesive gold, yet thought that cohesive gold had its place, but not in the filling of cavities. Good fillings are made of cohesive gold, but soft gold is more easily and more perfectly adapted to the walls of cavities, and for that reason is better suited to the wants of the average practitioner. For the finishing of fillings cohesive gold is to be preferred, on account of the harder surface it affords. For contour work, when the original form of the tooth is to be restored, it is very desirable; but for the filling of cavities, a different quality in the material is required. To arrest decay and save the tooth, a perfectly-fitting filling, one that will exclude moisture, is an essential requisite. He compared cohesive gold with the glass stopper of a bottle and soft gold with cork. The glass stopper *may* be accurately fitted, but the cork is easily adjustable. That form of gold should be used which average skill can employ successfully. If cavities presented regular surfaces cohesive gold would be less objectionable, but where irregularities exist a flexible material offers the greatest facility for perfect work. When cohesive foil is rolled between the fingers it coheres at certain points and the mass becomes hard and angular. Soft foil treated in the same way constantly diminishes in diameter without becoming angular, and does not become hard until it is well condensed. Cohesive foil, after being condensed to hardness, shows interstices under the microscope, and if beaten with a mallet when in this condition, blows falling near the margin of the filling tend to tilt the edge and draw it away from the wall of the cavity, and thus make a minute opening which admits moisture, resulting in eventual decay. Fissures and sharp angles in the cavity are much more completely filled with soft gold than with that which chokes and clogs. Cohesive gold is deceptive. It is liable to draw away from the wall of the cavity and to ball up under pressure, rendering

retaining points necessary to prevent tilting, which is caused by a want of complete adaptation of the filling to the walls. Such a filling is liable to admit moisture and soon show a suspicious color. When the color becomes blue it indicates decay and the filling is no longer useful.

DR. MORGAN asked Dr. Allport to give his idea of a perfect filling.

DR. ALLPORT replied that a perfect filling was one that would longest preserve the tooth by preventing decay. The metal should fit the walls of the cavity, absolutely, otherwise moisture enters and decay follows.

DR. BARKER: Would you use soft gold where one of the walls is lacking? Do you use cylinders?

DR. ALLPORT: I use soft gold in all cases. Formerly I used cylinders, when the cavity to be filled was cylindrical in form, but of late I mostly use pellets rolled unevenly.

DR. MORGAN entered his protest against the assumptions of the last speaker. The gentleman confesses his inability to fill cavities successfully with cohesive gold, and, hence, assumes that others cannot. The blue color that sometimes appears around a filling of cohesive gold is the result of faulty manipulation, and not of the character of the material used. To make perfect fillings, the cavities should be so shaped as to retain the gold when thoroughly packed; the gold should perfectly fill the cavity and should be solid throughout. The assumption that the methods of forty or fifty years ago were more effectual in preserving the teeth than are those of the present time cannot be demonstrated. [Applause.] It is a fact, that one-fifth to one-fourth of the teeth now filled and saved with cohesive gold, would have been condemned to the forceps by the best operators of thirty years ago.

DR. THOMAS FILLEBROWN, of Maine, united his protest to that of Dr. Morgan. He said: It is not necessary to use the mallet in packing cohesive gold. Some operators use the mallet very rarely. Cohesive gold can be packed by hand pressure with more safety than soft gold, because the former can be forced into place with a less number of pounds of pressure. There is no necessity for retaining pits. The first piece of cohesive gold placed in a cavity can be held in place until a second piece has been so adjusted as to retain

both in place. This can be done with one kind of gold as readily as with the other. To render soft gold sufficiently dense, from twelve to twenty pounds of pressure is required; while cohesive gold can be made equally dense with a pressure of only three to five pounds. When cohesive gold is used in this way, the fillings do not get blue at the edges.

DR. G. R. THOMAS, of Detroit: No two dentists operate alike, nor do any two physicians treat a given case alike, except as a coincidence. It is folly for one man to protest against another's method. Eighteen years ago when he came into the profession it was common to use gold as heavy as No. 20 and some used as high as No. 240, but they don't do it now. Has frequently seen fillings forty years old made of soft gold, through which an excavator could be pushed, preserving the teeth well, but at that time dentists did not attempt to fill many teeth that are now filled successfully; the teeth with doubtful cavities were usually extracted. He was taught that retaining pits were necessary, but should now regard a filling as a very poor one that required retaining pits for security. Fillings should be both useful and beautiful and such fillings may be made by the use of soft gold within the cavities and cohesive upon the surface. Agrees with Dr. Allport that cohesive gold is very deceptive. Young men should be taught the use of soft gold before they attempt the use of cohesive, otherwise they are liable to use larger and larger pellets until their fillings become very porous. Cohesive gold is liable to ball or burr, and draw away from the walls and towards the center of the cavity, and when the walls are thin the enamel is often checked by the force of the mallet in keeping the filling against the walls.

PROF. TAFT, of Cincinnati: There is great diversity of opinion relative to methods. Cohesive gold can be, and is, adapted to the walls of a cavity as easily and as perfectly as non-cohesive gold. [Applause.] Had only known of the use of No. 240 gold in experiments. Nos. 24, 40 and 60, are sometimes used where the use of soft gold would be impracticable. For every case of a soft gold filling that can be perforated with an instrument, that has stood for forty years, a decayed tooth can be shown that has been preserved equally as long without any filling at all. Cohesive gold can be as perfectly packed as non-cohesive, and operators who cannot prevent

the "balling" of gold, or its drawing from the walls of a cavity, will find the fault either in unsuitable instruments or in a want of knowledge as to their proper use. Does not object to retaining pits, thinks they are advantageous in leaving the left hand free. It is difficult to hold gold until the cavity is half filled, and if it moves ever so little it is almost impossible to replace it precisely in the first position. With regard to Dr. Fillebrown's statement that soft gold required a greater amount of force for its consolidation, we should not forget that soft gold was habitually introduced in larger quantities than cohesive, and if the quantities of each variety were equal, the amount of force or pressure that each would require would be nearly the same. Did not understand what Dr. Thomas meant by "burring up;" has seen gold so harsh and hard as to be difficult of manipulation, and thinks Dr. T. must have been working gold of that description.

DR. THOMAS explained that by a "burred" filling he meant one made of cohesive gold that would show prominences on its surface when rolled in the fingers. The crystals cohere readily, and the more you try to straighten and smooth it, the more you can't. He accepted Dr. Tucker's explanation of the cause of the failure of cohesive gold fillings, viz., the sealing of the tubuli of the dentine, and not the ingress of outside moisture.

DR. ATKINSON: It has been said that all the decayed or decaying dentine should be removed from the cavity previous to filling. This should not be done if its removal would expose or nearly uncover the pulp. The material used in filling has less to do with the success of the operation than a knowledge of the principles involved, and the exercise of manipulative skill. It has also been said that almost any one can make a filling moisture tight at its surface, and yet almost nobody does.

DR. G. J. FRIEDRICHS, of New Orleans: Caries of a tooth is attended by a calcification of the tubuli of the dentine caused by a resistant action of the vital forces for the protection of the pulp. This not unfrequently results in an arrest of the decay. May not this be the case where fillings that can be easily pierced with an instrument, have lasted for forty years? Believed that little depended on the kind of gold used, but much of the skill of the operator who

handled it. Frequently sees fillings of crystal gold, cohesive gold, and non-cohesive gold all doing equally good service.

DR. BENJ. LORD, of New York: That is the whole thing in a nutshell. Teeth were filled with non-cohesive gold before cohesive gold was known, and since its introduction with cohesive gold, with equal success. Not so much depends on any inherent property of either, as upon the handling—the manipulation. Prefers soft gold for all simple cavities—cavities having four, or even three good strong walls. For contour fillings, especially those extending beyond the margins of cavities, prefers cohesive gold, either exclusively or in conjunction with soft gold. For general purposes believes soft or non-cohesive gold preferable, for the reason that its plasticity is maintained while it is being worked, which is not the case with cohesive.

A few make good operations with cohesive gold, but thinks the great majority can produce better results with soft gold.

(TO BE CONTINUED.)

TRANSPLANTATION AND REPLANTATION.

At the period when transplantation was systematically performed, the operators kept themselves supplied with an assortment of dried teeth, *i. e.*, sound teeth, obtained generally from the dead subject, to make use of in case the tooth to be transplanted should not prove adaptable to its new abode. The process is not spoken favorably of, as the results were mostly unsatisfactory, but at times such teeth became perfectly firm, and even resisted the greatest efforts at their removal. We can hardly for one moment suppose that teeth in the condition these were could have ever become attached to a living alveolo-dental membrane, and the difficulty of accounting for this firmness would have been great indeed, had it not been already solved for us. In Langenbeck's Archiv. fur Chirurgie, vol. iv., is a paper on "The Replantation and Transplantation of Teeth," by Dr. A. Mitscherlich, which deserves to be better known, and which, apparently, cannot have come under the observation of those who recently contributed to the *Lancet* on the subject, the excuse for

which is less, since it has been translated into English.* The author, in addition to much interesting and original matter, records the following experiment: "In the upper jaw of a dog of a year old, Dr. Mitscherlich inserted into the socket of an incisor he had removed, a similar tooth taken from a dog's skull, and which he retained in *situ* by means of a silver wire passed through a hole in the tooth, and a hole bored through the alveolar process of the jaw. After six weeks the dog was killed, having been given the last few days three grains of picronitrate of potash three times a day; the carotids were immediately injected. The muscles, like the gums, were colored yellow; neither, however, in the implanted tooth nor in the sound ones was any alteration of color perceptible. The silver wire was porous, and no longer held the tooth; it was removed. The tooth was quite firmly seated, and could not be moved in the least by the fingers. The gums, as in the remaining teeth, were accurately applied both to the alveolar process and also to the tooth itself, and nowhere could any alteration be found in it. The tooth was sawn through lengthways, together with the upper jaw, with a fine saw, so that the pulp cavity was laid bare in its whole extent. The latter was only filled with a little detritus, and no trace of the pulp was discoverable; none of the injection, too, had been forced into the cavity.

"The tooth was everywhere most intimately connected with the surrounding parts, and suppuration showed itself nowhere. Of the periosteum, on the other hand, there were only in a few places some small remains discoverable. On the posterior surface of the tooth two small cavities were visible, the larger of which lay more towards the point of the root, and extended to the pulp cavity; they were filled with a soft substance, and their walls appeared roundish. These appearances were entirely confirmed by microscopical examination, inasmuch as only in a few places, especially on the anterior surface of the tooth, were traces of the periosteum to be demonstrated; where this was absent the tooth was eaten away, and its absorption had proceeded in such a manner that a multitude of globular elements appeared on the section, resembling the fragments which we find in ivory pegs which have been bored into

* "Archives of Dentistry," edited by Edwin Truman, vol. i, p. 169.

bones, and retained in them a considerable time; in the two above-mentioned cavities the absorption had proceeded farther and farther, and had at last attained its above-mentioned great extent. The cementum could still be demonstrated in certain places, it was, however, absorbed in the greatest part of its extent. In the cavities of the tooth substance, masses of bone were embedded, they were applied to the walls of the cavities without any kind of intermediate substance, and so held the tooth with such extraordinary firmness. This osseous deposit, which was directly connected with the alveolar processes, was freely traversed with blood vessels, which sometimes extended themselves close up to the tooth substance. It was also so fully developed, that the process had to be looked upon as fully accomplished, and therefore, a later exfoliation of the tooth was not to be expected. The dentine itself showed nothing abnormal."

We have quoted the author of the foregoing at some length, as some of his conclusions upon this interesting experiment might seem antagonistic to our own. Thus, whilst we agree with him in concluding that a dead tooth becomes united to a living jaw by a certain amount of absorption of its roots by osteoblasts, and a subsequent calcification of such tissue, we do not believe such process is fully accomplished or permanent. The valuable researches of Tomes and De Morgan show that during life a continual process of formation and absorption is taking place in bone, whilst the former has also pointed out that the process of absorption in the roots of temporary teeth is one alternating between absorption and deposition, though in the end in favor of the former, *i. e.*, that the osteoblasts which effect the absorption of the dentine often become calcified, but are again eventually decalcified and become active osteoblasts. What determines these bodies to act, so to speak, in a positive or a negative capacity, would be most interesting to discover, and, in considering the subject, we can hardly overlook the views of Mr. Brigman, who compares the process of bone formation and decalcification to what occurs in an electrolytic cell, where, by changing the direction of the current, the electrodes assume precisely opposite functions.

If, then, we could discover the conditions that would preserve the bone tissue, in connection with the dentine, from undergoing decalcification, we might, with every prospect of success, transplan

dead teeth, but which, as at present carried out, invariably, we believe, eventually suffer the fate of ivory pegs introduced into the extremities of bones in disunited fractures. Indeed, this result, although more slowy effected, appears nearly always to follow in those cases where the transplanted or replanted tooth has lost much of its alveolo-dental membrane; whether the excising of a portion of the root, as advocated by Magitot, will prove beneficial or otherwise, remains to be seen.

Porcelain teeth, having indentations in their roots, have been suggested, first, we believe, by Mitscherlich, and again by a recent writer in the 'Lancet." The former actually attempted two cases, and with the success we should have anticipated; for when, after four or five weeks, the caoutchouc splint which retained them in *situ* was removed, they immediately followed the splint and fell out. "Ossification had not taken place; the entirely heterogeneous mass of stone had acted as a foreign body, produced granulation and suppuration, and so prevented union."

In conclusion, we think enough has been stated to show that transplantation or replantation of living teeth, or, at all events, of teeth having living alveolo-dental membrane, may be exceptionally carried out with benefit to the patient; if the chances of permanent success be not very great, the chances of injury are, we believe, small, and have been greatly exaggerated. No such case has come under our observation; but then, in all we have witnessed, the transplanted or replanted tooth has never been ligatured or otherwise forcibly retained in its alveolus. We believe many of the cases of failure, as probably those also of bone exfoliation, arose from this procedure. A tooth, after either operation, although at the time perfectly adjusted to its proper position, becomes, after a day or two, elongated from its socket, and less firm; the result of effusion into the alveolo-dental membrane and about the tooth; as this material becomes organized it forms, no doubt, the medium of union between the dental and alveolar portions of that membrane. At all events, after a week or so, the tooth again recedes into its socket, and as it does so becomes firmer and less sensitive to pressure; if our view be correct, the employment of a ligature, or forcible retention of the tooth, can only be objectionable. A very different mat-

ter, however, will be the adjustment of a plate contrived so as to protect the transplanted or replanted tooth from violence or pressure until its attachment is ensured.—[*Monthly Review of Dental Surgery.*

THE BROMIDE OF ETHYL AS A LOCAL ANÆSTHETIC.

BY M. TERILLON, THE SOCIETE DE CHIRURGIE.

(From the French by F. Peterson, M. D.)

I have used this agent a dozen times for obtaining anæsthesia in the employment of the thermo-cautery. In all the cases I have seen, produced at the end of one or two minutes a blanching of the part, indicating anæsthesia of the skin. The pain was absolutely nothing. When it is necessary to prolong the anæsthesia, it may become sufficiently profound for opening abscesses situated one centimeter below the skin. The blanching of the skin is not an indispensable part of the anæsthesia, but so far this method has not deluded my hopes. I have, however, failed in one or two cases, because certain atomizers gave much too fine a jet, and then the result was not obtained. I have had made an apparatus of a larger caliber, which anæsthizes the surface of the hand in one minute and some seconds. It is necessary that the beak of the atomizer be at a moderate distance from the hand, some eight or ten centimeters.—[*La France Medicale, in Buffalo Med. and Surg. Journal.*

MISCELLANY.

MERCURIAL AMALGAMS.

BY M. G. CUNNINGHAM.

After twenty years of stubborn fight, supporters of gold as a filling for decayed teeth, accept the possibility of plastic material being in certain cases its superior; throughout this period I have been content to hold my peace, and act entirely on my own judgment in the selection of material. As, however, it seems to be the fact that a

man who uses plastic filling without danger of being termed a "quack," may speak, I would, through your kind agency, convey to brother dentists my method of preparing metallic amalgams, which has saved me much trouble and my patients a large number of teeth.

In using amalgam, the first thing we ought to take into consideration is, whether that which we are using and calling by that name is such; and I venture to say that in a very large number of cases it is no amalgam at all, but a concrete admixture of solid metals with liquid mercury. In the early days, when metallic precipitate of silver was employed, perfect amalgamation was not difficult to obtain, provided the precipitate had been in the first instance properly washed and carefully stoppered, the minute subdivision of the metal and absence of oxydation aiding largely in this result. The fillings of the present day are of a totally different character—coarse in grain, and of a nature to oxydize on even momentary contact with air, they become difficult to amalgamate with mercury, which, in itself, is a highly oxydizable metal, so that recourse is often had to a glass tube, and violent agitation to produce that which is at best only a semblance of what it should be—a thoroughly homogeneous mass, that upon setting will retain a uniform texture and density proportionate to the constituents of which the fillings are composed. If, however, to the filings and mercury be added a drop or less of sulphuric acid, either in the palm of the hand or mortar, it will be found that the metals will almost instantaneously amalgamate, whilst the oxydes combining with the acid leave a residuum which, by its quantity, clearly shows what a very imperfect body could have been a so-called amalgam containing only a small portion of them. Washing in pure water at once removes all trace of acid, and a thoroughly reliable stopping can be at once produced from materials otherwise worse than useless.—[*Ibid.*

CELLULOID—Celluloid is made by dissolving pyroxyline (or gun cotton) in camphor, instead of ether or alcohol. To prepare it for treatment with the camphor it is first ground in water. After the water has drained off, it is placed under pressure in a perforated ves-

sel, and almost converted into a solid body, which, however, still contains enough moisture to prevent spontaneous ignition in the subsequent operations. This mass is now intimately mixed with camphor by grinding them together in water. One part of camphor, by weight, is employed to two parts of pyroxyline, but other proportions can be employed with good results. The desired pigments and other substances are added along with the camphor. After they have all been very thoroughly mixed, the mass is subjected to a very heavy pressure, which removes all the moisture and also brings the camphor into more close contact with the pyroxyline to aid it in dissolving the latter. The dried and pressed mass is now put into a vessel of the form in which it is desired to have the celluloid. In the top of this vessel is a piston or plunger, so that it can be subjected to the action of a hydraulic press. While under pressure it is heated by steam or otherwise to from 140° up to 265° F., according to the quantity of the mixture. It is kept at this temperature and under this pressure until the camphor has dissolved all the pyroxyline. The temperature increases the solvent power, while the pressure keeps the ingredients in intimate contact. The result is a solid mass perfectly homogeneous throughout.

Artificial ivory is prepared from 100 parts of ivory dust, 100 of pyroxyline and 50 of camphor. The pyroxyline is ground wet, then pressed until only enough water remains in it to prevent ignition. It is then mixed with the ivory dust and camphor, and pressed between absorbing cushions until all the moisture is extracted. Then 50 parts of nitrite of ethyl are added. The mixture is then left for several hours in a closed vessel until the nitrite is equally distributed throughout the mass. It is next subjected to heavy pressure in heated cylinders, as before described, and rolled between hot rollers. The product thus obtained has the appearance of natural ivory, is free from streaks and spots, is not attacked by moisture, and while hot can be pressed into any shape.

Celluloid as it leaves the press is about as dense as sole leather, but hardens in the air, owing to a slight evaporation of camphor. In the finished product there is still a good deal of camphor, and herein is found the essential advantage in the use of camphor over ether, alcohol and other liquid or volatile solvents. All such solvents are completely removed from the mass, while enough cam-

phor remains in it perpetually to serve as solvent over and over again, and to give it the property of being readily changed into any other shape at a high temperature without the addition of any other solvent.

By another process a dilute solution of camphor is employed, 1 part camphor to 8 of alcohol, which will not dissolve pyroxyline at common temperatures, but does so when heated. The pyroxyline is ground, mixed with pigment or dye, the water all removed, and 1 part of solvent added to 2 parts of pyroxyline, well stirred and put in a closed vessel until the solvent has saturated all parts of it. It is then heated under pressure as before described. The Compagnie Franco-Americaine, in Stains near Paris, has been making celluloid for over three years, and has a branch at Mannheim, in Baden. The rubber-comb company in Hanover also took up its manufacture, but abandoned it again, owing, it is said, to the danger from fire. Renleaux is of the opinion that some experimenter should contrive a method for dispensing with the camphor, and also rendering the pyroxyline less combustible; two difficult problems which Professor Wagner believes are not likely to be accomplished.

Unlike hard rubber, celluloid does not beeome electrical when rubbed. The odor of camphor can only be noticed when the substance is warmed, or on being rubbed. The numerous uses to which it is applied are too well known to need repetition here.—[*Jahresbericht.*

RAPID BREATHING IN RELIEF OF PAIN.—Dr. Bonwill, a Philadelphia dentist, in a paper read at the Philadelphia Medical Society ("Phil. Med. Times," July 17th), stated that in dental and other operations not requiring more than twenty or thirty seconds he had found that persons could be rendered insensible to acute pain by rapid breathing, carried as far as 100 respirations in the minute, consciousness and general sensibility remaining intact. The patient feels every touch, and in order to be exempt from pain the inspirations must be kept up vigorously during the whole operation without stopping for an instant. It is difficult for a person to respire more than 100 times in the minute in consequence of the exhaustion produced, and for a minute after the end of the process he cannot

breathe more than once or twice; and very few can raise hand or foot. During the last four years Dr. Bonwill, by employing this plan in dentistry, has been able to do without any anæsthetic; and in major operations, less of an anæsthetic is required when rapid breathing has first been employed, the after effects also being much less unpleasant. It is also a highly useful plan in labor. The "New York Med. Record" (August 21st) observes that a perusal of the papers and discussions on this subject leads to the conclusion that there may be something of practical value in Dr. Bonwill's discovery. It seems that analgesia to a greater or less extent can be obtained by it; but its practical usefulness is not so well established. A good many failures have occurred, but the method is so simple that there ought to be no trouble in determining its exact value. The most favorable position for the patient is lying down on the side, and it is generally best to throw a handkerchief over the face so as to prevent his attention from being distracted. He should then be directed to breathe at the rate of about 100 respirations in the minute. The directions best given is to "blow out in rapid, puffing expirations." At the end of from two to five minutes, the patient continuing his rapid breathing all the while, teeth may be drawn or incisions made, and there will generally be an entire or partial absence of pain, which will last thirty seconds or more. According to Drs. Garretson, Hewson, and Kite, it takes from one-half to three-fourths less of the liquid anæsthetics to produce insensibility when their administration has been preceded by rapid breathing.—*Med. Times and Gaz.*

TREATMENT OF NEURALGIA BY ACONITINE.—In a recent number of "Le Praticien" is a resume of a work by Dr. Oulmont, physician to the Hotel Dieu, on the use of aconitine in neuralgia. Dr. Oulmont says that aconitine succeeds perfectly in certain forms of essential facial neuralgia—that is to say, not connected with other lesions, not markedly intermittent or periodic; in fact, congestive neuralgias, as Dr. Gubler calls them, generally supervening as the result of cold. In these cases aconitine effects cures with great rapidity in two or three days. He has seen a case of facial neuralgia seven days old, without well-marked periodicity, which

had resisted sulphate of quinine, yield instantaneously and definitively to one quarter of a milligramme of the nitrate of aconitine.

Success is more marked and more rapid in recent than in old neuralgias. He can mention, however, cases which had lasted one month, two months, and five years, which have been cured; the the first in seven days, the second in three days, and the third in three weeks. Aconitine is not without action in secondary neuralgia and hyperæsthesia, such as is seen in dental caries, caries of the temporal bone, internal otitis, paraplegia, etc. Acute articular rheumatism treated by aconitine has given good results. In four individuals, to whom the remedy was given in the dose at first of half a milligramme, rising to one and then one and a half milligrammes, cure was effected once in eight days, and the second time in ten days. In the other cases cures were also effected, but only on the fifteenth and eighteenth days, and the dose of the remedy was raised gradually to two and two and a half milligrammes. In neuralgia of the trigemini, Gubler says the effects are truly marvelous.

Dr. Oulmont concludes that aconitine is a well-defined remedy, which acts in man surely and regularly, but on account of its energy it must be used in very small doses and at long intervals. Where neuralgia is accompanied by well-defined intermittent and periodical attacks, it is necessary to combine quinine with the aconitine.

EDITORIAL.

CAPTAIN EADS' SHIP RAILWAY.

The "Scientific American" of Nov. 13th contains two full page illustrations of Captain Eads' proposed railway for transporting ships with their cargoes across continents.

Captain Eads claims by his plan to be able to take loaded ships of the largest tonnage from one ocean to the other across the Isthmus of Panama, as readily as can be done by a canal after the Lesseps plan, and at a much less cost for engineering construction.

The project is certainly bold and ingenious, and the projector anticipates no serious difficulties in carrying forward his enterprise. The engravings referred to in the "Scientific American" show the proposed construction of not only the railroad, but the appliances for transferring the ships from the water to the rail.

In addition to the large number of engravings, illustrative of engineering works, inventions and new discoveries which appear weekly, the "Scientific American" has, during the past year, devoted considerable space to illustrating and describing leading establishments devoted to different manufacturing industries.

This feature has added very much to the attractiveness and usefulness of the paper. More than fifty of the most important industrial establishments of our country have been illustrated, and the processes of the different manufactures described in its columns. The "Scientific American" has been published for more than thirty-four years by Munn & Co., 37 Park Row, N. Y., and has attained a larger weekly circulation than all similar papers published in the country. The publishers assure the public that they have not printed less than 50,000 copies a week for several months.

ODONTOGRAPHIC JOURNAL.—Among the late additions to our periodical literature is the "Odontographic Journal," a handsome quarterly, conducted by J. Edw. Line, D. D. S., and published by Davis & Leyden, Rochester, N. Y. The third number has been recently received, and we find its contents of a very useful and interesting character. Journals like this serve to cultivate a taste for scientific reading, and its favorable reception indicates an increased appreciation of this class of magazine matter.

DR. HOLBROOK'S Substitute for Air-Chambers, after more than a year's experience, has given us such entire satisfaction, that we have adopted its use in all full dentures, and in partial upper cases, where the base covers the posterior portion of the palate. We notice that he has reduced his fee for instruction and use to five dollars, which is certainly little enough for so valuable an improvement.

ANOMALY.

On the 20th day of September I extracted the right superior molar for a man (a Jew), the crown being all gone save one cusp, which came off as soon as embraced by the forceps. There were two roots, one on each side of the center of the process, one being on the labial, the other on the palatal side. Will some one explain

the cause, or probable cause, of this remarkable freak of thus locating the roots of this tooth? The roots were like those of any ordinary molar tooth. J. B. TULLIS.

Marshall, Texas.

BOOK NOTICES.

A PRACTICAL TREATISE ON MECHANICAL DENTISTRY. By JOSEPH RICHARDSON, D. D. S., M. D., Professor of the Principles of Prosthetic Dentistry in the Indiana Dental College; formerly Professor of Mechanical Dentistry and Metallurgy in the Ohio College of Dental Surgery. Third edition, revised and enlarged, with one hundred and eighty-five illustrations. Published by Lindsay & Blakiston, Philadelphia, 1880. Hildreth Printing Co., St. Louis.

Part first of this excellent work is devoted to metallurgy, and the different modes of applying heat. The metals treated of are gold, silver, platinum and platinoid metals, aluminum, copper, zinc, lead, tin, antimony and bismuth, and their respective alloys.

Part second is devoted to artificial dentures, and comprises treatment of the mouth, materials and methods of taking impressions, models and dies, partial and full dentures, porcelain teeth, block work, the continuous gum method, and remarks on the various materials used as base plates, as gold, platina, vulcanite, celluloid, and the more recent gold alloy. The closing chapter treats of "defects of the palatal organs and their treatment by artificial means."

To say that this is the leading standard work on mechanical dentistry, and beyond question far the most valuable work extant upon the subject, is to say what every American dentist well knows. The author has long held the highest rank as a writer on this branch of dental practice, and the former editions of his work have deservedly met with universal approval.

Professor Richardson excels in elegance of diction, and clearness of description. Indeed, one can scarcely imagine that so prosy a subject as that of mechanical dentistry, could well be invested with a greater interest. This is largely due to the perspicuous style, and the graceful forms of expression employed by the author.

That this work will constitute the chief basis of our future text books on mechanical and prosthetic dentistry long after the author has passed to other and higher fields of labor, can scarcely be

doubted. The work is issued in Lindsay & Blakiston's best style, and the price at which it is offered brings it within the reach of every student and practitioner. Many of the latter class are not sufficiently liberal in supplying their libraries with the new editions of standard works. None can afford to be without this valuable work, for as a work of reference it would annually repay its cost many times over. Price, $4.00

PHYSICIANS' VISITING LIST FOR 1881—Containing the Metric System of Weights and Measures, Posological Tables, showing the Relations of our Present System of Apothecaries' Weights and Measures to that of the Metric System. Gives the Doses in Both.

This is a valuable addition, and will materially aid the physician. So many writers now use the metric system, especially in foreign books and journals, that one not familiar with it is constantly confused, and in many cases unable to understand the measurement or doses. The Metric System received the indorsement of the American Medical Association, at the late annual meeting in New York, and they recommend its teachings and practice in Medical Colleges, Clinics, etc. Lindsay & Blakiston, Philadelphia. Hildreth Printing Co., St. Louis.

ADDRESS INTRODUCTORY TO THE TWENTY-SIXTH COURSE OF LECTURES IN THE PENNSYLVANIA COLLEGE OF DENTAL SURGERY. By Wilbur F. Litch, M. D., D. D. S., Professor of Mat. Med. and Mechanical Dentistry. October, 1880. Published by request of the class.

We quote a single paragraph of this able and interesting address:

The instruction you will receive in the anatomy and physiology of the dental organs and their associated parts you will find far more minute than that to be derived from the courses of anatomy and physiology as at present constituted in the ordinary medical curriculum. The same is true of the courses in chemistry and the materia medica. All are taught from the standpoint of your needs as dentists and not as practitioners of general medicine. There is here no division of interests, aims or purposes, but a concentration of effort from every instrument and agency of the college to this determinate object—to make you thorough dentists.

THE MISSOURI
DENTAL JOURNAL.

A Monthly Record of Dental Science and Art.

VOL. XII.—DECEMBER, 1880.—NO. 12.

FROM TRANSACTIONS OF THE EIGHTEENTH ANNUAL SESSION OF THE IOWA STATE DENTAL SOCIETY, HELD AT OSKALOOSA, JULY 13 TO 16, 1880.

PRESIDENT'S ADDRESS.

Gentlemen of the Iowa State Dental Society:

In accordance with a custom established in this and other societies of a similar nature, it becomes at this time my duty to offer for your consideration such reflections and suggestions as have presented themselves to my mind as appropriate for the occasion. The task I approach with great reluctance, realizing, as I do, my inability to either satisfy your expectations or meet my own desires, and remembering, too, the words of wisdom which have fallen from the lips of those whom you have called to preside over your deliberations in by-gone years. We have again assembled after having added to our temporal sojourn another year of study, investigation and experience; our purpose—to share with each other the results of that mental toil and research. I have sometimes thought that the popular idea of such gatherings as this is, that they are more for the purpose of relaxation and recreation than for improvement, but I am convinced that the *thinking* class in all communities give us full credit for our endeavors to extend our knowledge, not forgetting, perhaps, that as *our* stock of information is increased, so will *they* in

turn be benefited. It is to this class, indeed, we must and do look for appreciation and support.

I shall take but little of your time in reviewing the history of our specialty, interesting as it always is, and will have but little to say relative to the need, purposes and benefits of association, for with both of these subjects you are all familiar, and with the latter are *specially* interested, otherwise your *absence* instead of *presence* would be noted. The day has arrived when not only the professions, but almost all trades and callings, are organized, and have their conventions and meetings for counsel and free discussion, and have special journals and a literature to meet their requirements. Owing in a great measure to this fact, perhaps in no other land than ours can there be found a more liberal and intelligent class of mechanics and artisans. The material progress in the science of dentistry dates from the establishment of "The American Society of Dental Surgeons," which met for the first session in the city of New York, in the year 1840, and which numbered among its leading spirits such men as Drs. Horace H. Hayden, the Parmlys, Chapin A. Harris, Josiah F. Flagg, E. B. Gardette and Solyman Brown.

A fact may be mentioned here, that as early as 1817 Dr. Hayden had suggested the formation of a national convention of dentists, and the historian informs us that "he renewed his efforts from time to time only to fail," which clearly indicates that but few at that time had advanced sufficiently to appreciate the benefits of organization. We are almost startled when we read that among the objects of that society, as set forth in Article I of its Constitution, was the following: "To give character and respectability to the profession by establishing a line of distinction between the truly meritorious and skillful, and such as riot in the ill-gotten fruit of unblushing impudence and empiricism;" because, if in pursuance of this object a more constant effort had been made to contribute to its fulfillment, we would not be obliged to deplore the low state of the profession in many portions of the country at the present day.

The struggle continues, unfortunately, in the same direction, and we cannot fail to see that the same objects must constitute not an unimportant part of our work as a society for some time to come, owing to the lamentable fact that our beautiful State is being over-

run by a horde of dental outlaws from other States, who are forced to change their base of nefarious operations by reason of the salutory laws for the protection of the people of those States. It is a source of sincere regret that Iowa should stand almost alone, among the progressive States, without such a legal enactment, and it is a mistaken idea that the *legitimate* practitioner desires such a law for *his* "protection," for he *needs* none; it is the *people* who should be shielded from those whose crimes against humanity are worse even than those of the highway robber.

Persistent effort will ultimately be crowned with success, but our hopes may be deferred until our hearts grow sick, seeing as we do, the wicked outrages committed in the name of our calling. The people at last will take the matter in hand, and *demand* of our lawmakers that these vampires of society and the profession shall be no more *permitted* to prey upon them. I have asked myself the question many times, whether the *proportion* of really professional men, among those who at this day are called dentists, is greater than twenty or twenty-five years ago; and I must confess, that with more than fifteen years of personal observation, and such information as I have been able to obtain, I find the question not easy to satisfactorily answer. *Then* it was thought *necessary* to possess, with other qualifications, at least a reasonable amount of mechanical skill and *some* judgment to succeed at all, but since the introduction of the cheap bases for artificial dentures, and the growing tendency of depreciating the compensation for *all* services, our ranks have been largely augmented by those whose principal characteristics seem to be a total want of appreciation of what is implied in the idea of professional standing or dignity, and whose lack of true skill and scientific attainments are only less conspicuous than their boastful assumptions and greedy desire to "make money," regardless of the consequences to those who unfortunately fall into their hands. All this, in spite of the colleges, periodical literature, and other means afforded for the education and advancement of a scientific calling.

I do not believe the signs of the times as relates to us, however, are all bad; neither do I agree that they are all good. There is certainly enough of evil to cause us to pause and reflect, and when

we have discovered wherein it lies, our duty to aid in its correction is made plain. It is discouraging when we see quackery thriving so *luxuriantly*, and the *willing* victims those whose good judgment in other matters ought to serve them here also. We read and hear much of "educating the people," and "elevating the profession;" what remains to be done in both directions is not a little. I have already referred to the "thinking class;" unfortunately they are in the great minority, as is well illustrated in the anecdote related of a celebrated English quack who was visited by an old-time friend from the country, and who familiarly addressed him as "Zam." "I'm glad to see thee, Zam," said the rustic, "but how's't mon? Thee never *had* no more brains nor a poonkin." Taking him to a window the quack bade him count the passers-by. "How many have passed?" he asked, after a few minutes. "Nointy or mayhap a 'undred." "And how many *wise* men do you suppose were among this hundred?" "Mayhap one." "Well! *all the rest are mine.*" If what I have said is true, how shall *our* influence be exerted to bring about a better state of affairs? How shall we fit *ourselves* for our duties, and what shall we insist upon as necessary qualifications for entrance upon the duties of the profession?

First of all, it seems to me, the one who would be "a respectable member of a respectable profession," must be possessed of a sterling character, which comprises all the qualities of honesty, uprightness, and trustworthiness; he should also have a good education, an unsatisfiedness with present attainments, a love for study, with a determined purpose to excel; sound judgment, nerve, a kind heart and gentle hand, and lastly, but by no means least, it is absolutely essential to have a mechanical taste and ingenuity.

The time is approaching when, to receive recognition as a professional man, one must be *possessed* with the knowledge to entitle him to such recognition; and I think the time *now is*, when the standard of recognition should be *much* higher than it has been heretofore. With the colleges for special education that now call for co-operation and support, the old methods of office studentship and teaching can hardly be apologized for. In his introductory lecture before the class at the first session of the Baltimore College of Dental Surgery, the late Prof. Chapin A. Harris said: "It is to be hoped

that the day is not far remote when it will be required of those to whom this department of surgery shall be entrusted, to be educated men, and well instructed in the theoretical and practical principles. Elevate the standard of the qualifications of the dental surgeon to a level with those of the medical practitioner, and the results of his practice will be always beneficial, which at present is frequently the reverse." Whichever view we take of the subject—of dentistry as a specialty of medicine, or as an independent profession—it cannot be denied that the more one *knows*, the better for him, and consequently for his patrons. To this end then, let us *insist* that those over whom we have any influence shall not enter upon practice until they are *qualified*—with all that the term implies. The failure of securing an appropriation by our legislature for the establishment of a Dental Department in the University at Iowa City, is a source of great disappointment to those who have so patiently, ardently and hopefully labored for the cause of dental education in our State. It is also no less a disappointment to a great majority of the members of this society, and to many who were hoping to take advantage of the opportunity of there fitting themselves for higher usefulness in their work.

The standard of examination of those not graduates for admission to this society, should be more uniform, and at the same time a higher grade of qualifications ought to be required than is sometimes done. The Committee on Membership should perform their duties without fear or favor, recommending *only* such as *earn* their right to membership. Then will it be an honor to be passed by them, and the incentive will be greater to all who look forward to association with us in our organized capacity.

If, on the other hand, it is deemed best to admit *all* who apply for admission, regardless of attainments, even after the probationary period of one or two years, it were better that we abandon our name and resolve ourselves into a yearly Convention.

There is another matter that demands the serious attention of this meeting, and which has contributed much to a disregard of our organic laws; that is, the failure to rigidly enforce its penalties upon violators of the Code of Ethics and upon delinquent members. *A law to be respected must be carried out to the letter.* Now for the future. What shall we do, or what *can* we do toward increasing the

interest of the profession in the State in our work? We are not independent beings, however much we may think so, and he who isolates himself with that idea will sooner or later find himself "fossilized;" and we do not hesitate to assert that any professional man who thus *willfully refuses* to be identified with some representative society of his specialty, and who will not contribute to the advancement of his profession, loses more than *it* does, or the society would gain by his connection with it; and further, such an one places himself in a position to be unworthy the respect, confidence or fellowship of a progressive profession.

DISCUSSION.

DR. INGERSOLL: I am very much pleased with the address in this respect: that the president has exhibited an appreciation of the dental calling. Too many in the profession seem to have no proper regard for their vocation. So long as dentists place a low estimate on their calling, it must be expected that people generally will place it no higher. How few, even among the intelligent people of the community, have any adequate conception of the true nature of dentistry. Their idea, whatever it is, is formed from the acquaintance they have made with dentists and dental skill. Dentists mus, therefore, *be* what they *would have* the community esteem them to be.

If dentistry has a scientific basis, only study and research can bring the profession up to the proper standing. Those of the profession who have kept posted in the literature of our journals for the past five years, are aware that there is no question that has called forth more discussion than that of dental education. This has been true, not only in this country, but in England and in all other countries where dentistry has an organized existence. Thoughtful men in the profession all over the world are considering seriously how the dental profession can be brought up to a higher rank.

Some have conceived that the answer lies in more thorough manipulative skill—in the more thorough preparation of the student of dentistry, for the practice of his chosen profession. To accomplish this, they demand a more extended curriculum and a longer time in our dental colleges. Thus, no doubt, a part of the object will be accomplished—more thorough manipulative skill.

But as it is the mind that perceives the necessity of an operation, and the method and results of its accomplishment, all manipulative skill in practical dentistry is limited by the mind's capacity—is limited by a man's mental development—by the range of his perceptions and the rightness of his judgment. It is the mind that makes the high, true, noble, *great man* in any profession, in the highest or in the humblest calling. If we find in one of our American pulpits a preacher illy able to interest and instruct the people, not gaining the respect of intelligent and educated men, what should be done to bring the man up to grade? Would you send him back to the Theological Seminary to spend another year? He may get there more theology, but will it correct his grammar, sharpen his perceptions, widen his range of thought, animate his delivery, and improve his logic? These are elements to be found in his mental endowments and in his early culture, not in the Theological Seminary. Some think they see the desired improvement and progress of the dental profession in the dental college. But in my opinion, gentlemen, the elevation of the dental profession must begin back of this—must begin before student life in the dental college begins. I see from the last report of the transactions of the American Dental Association, the Committee on Dental Education recommend that our colleges have a preliminary examination of candidates, and require all to have a good common-school education before entering the dental college. I am glad to learn of this one step being taken. When they shall decide that a good common-school education shall include the entire course prescribed in the high-school department of our common-school system, they will have taken another step.

Mental endowments, a love of study and a love of science, are the qualifications we need, to improve and elevate the dental profession.

Now, with regard to our taking students. I have refused for twenty years to take students into my office, and for the simple reason that I did not think I could make dentists of the best of them. I have said to them, you need to go to a dental college. If you intend to do that, time spent in a dental office will be much of it wasted. *After* passing through the college, time spent in a dental office with some intelligent and thoroughly practical dentist, will be of great benefit. I have observed in our State that those most

ready to take students, are least qualified to instruct them. In many cases those who know the least about dentistry are the instructors of the largest number of students.

When I learn of such cases it makes me disgusted with the whole idea of student life in an office, and I am ready for any step that will shut up all the offices of the country against the dental students. (applause). This would be progress in the direction of a more thorough and systematic course of training in our dental colleges. Then add the requirement of preliminary study and mental culture, and the dental profession would be greatly improved and elevated. It is mind that makes the man and the dentist.

DR. ABBOTT: I knew a dentist in Virginia who had a good education; he had the best education he could get in dentistry; he was honest and perservering, and yet he could not work because he had no manipulative ability.

DR. INGERSOLL: I spoke with special reference to mental endowment and culture in the scientific department of dentistry, because the profession is not so much at fault in mechanical execution.

DR. ABBOTT: I have had in my office two students, who are today practicing dentistry with moderate success. But they are not what I could wish them to be, for they have not had the advantages of a dental college. Theoretically, they are not up to the standard required by the profession. I have had several in my office for some months each, and found that they had not the manipulative ability, and were not adapted to the profession, hence, I advised them to seek some more suitable employment. I am glad that each one of them accepted the advice, and profited by it. In New York, I gave similar advice to a young man who was honestly studying the profession, but lacked manipulative ability; he thought his desire to learn would overcome that trouble; but after attending lectures and spending four or five years in a vain attempt, he gave it up. A person lacking native mechanical ability, may improve largely, but can never become a first-class operator.

DR. SPALDING: I did not expect to be called on here at this time, but I hold it is every man's duty to respond when he is called upon—to work in the harness wherever he is. On the general subject of dental education, I may say my heart is full. What our friend,

Dr. Ingersoll, said, is all correct and true; we have all felt it. The difficulty which presents itself to the dental educators, is to know what to do under existing circumstances. We would know very well what to do if we could make the circumstances; or if we could begin at the beginning. But we are obliged to take things as they are; we are obliged to make a beginning at a point where progress has been going on for a great many years, and certain fixed habits have been established; and then, besides, we have a large body of practitioners in this country who have not had the advantages of a dental education, at least, not of passing through college. Actual statistics show that only about one-fourth of the practitioners of this country are graduates. But the colleges can not do it all There is a certain proportion of the dental profession who are friends of the colleges, but there are very few who take hold of them with any enthusiasm, or who would ever in any way help them along. It is pretty hard for them; they need all the help they can get. Not only all the moral and mental assistance they can get, but also material aid. Many of them hardly meet expenses. My own experience is, that to-day I am about five hundred dollars out of pocket in consequence of being connected with dental schools. I know of several gentlemen that have expended money in this way.

In one college in Philadelphia each member of the faculty invested seven hundred dollars, and a professor in another school mortgaged his house to get the college out of debt. But the question is what shall we do? What *can* we do? We must work to the point of making every man who practices dentistry, and every man who proposes to come into our ranks after this, hold a degree. Why should we recognize one a dentist and call him Dr. who has no degree? Does any other profession in the world do it? None but ours. It has been excusable of former years, but is no longer excusable. Having accomplished the adoption of a rule for admission, we must then say to all practitioners: The way is open to you; no man shall be called a Dr. who has not a degree. Now these are practical points to which we should work. I have always been laboring in this direction.

Our college in St. Louis started out with the idea that we did not care where a man got his information. If he had the requisite knowl-

edge why not give him the credit of it? Do we gain anything by holding it from him? Not at all; we gain a great deal by bestowing it upon him. Now Mr. President and gentlemen, the college with which I am connected has been compelled by the action of the American Dental Association, to stop that excellent practice. I stood entirely alone, as an advocate of that idea in a whole gathering of men on dental education, where this subject was under discussion. Now, this all grows out of long established custom, and whether this custom is to be modified is a question for future decision. I am almost as intimately associated with the profession of medicine as with that of dentistry, but I say they are not *necessarily* connected with each other.

There are certain elementary principles which underlie both. Anatomy, Physiology and Chemistry are equally requisite to dentistry and medicine.

That knowledge which is requisite for dentists to understand and be familiar with, can be acquired better in a dental school than in a medical school, where the whole tendency is to qualify a man to practice medicine. Let us illustrate: Take anatomy, for instance. We would expect dentists and every physician to have a general idea of the structure of the animal body; but we expect the dentist to have an intimate knowledge of the microscopic anatomy of the teeth. We expect him to be familiar with the anatomy of the head, to know every bone, every muscle, every nerve. We expect him to be just as familiar with that as he is with the alphabet. Nine-tenths of the graduates of medical schools do not understand the simple structure of a tooth; they are not required to study it. So I say the medical method of teaching anatomy is not the best for the dentist. The same will apply to physiology and chemistry.

I like the paper just read, but we cannot select our material, but must choose from that which presents itself to us. A young man comes to a dental college, and says: "I want to attend a course of lectures; I am prepared to pay my expenses." The first thing to do is to examine his ordinary qualifications. If he has a good common-school education, it is hard to say, you can't attend lectures here; but, on the other hand, we are inclined to admit him, and let him try and judge for himself. The result is, I know, that a large proportion of those who go to dental schools never pursue dent-

istry as an occupation. The same remark applies to medicine. How many men there are who are educated in medical schools that never will make doctors? Now, I don't see anything to prevent that class of young men from entering our colleges. I think you must let them come in, take their course of lectures, and take their chances with the rest.

In my professional experience of forty years, I have had two students outside of my own family; one of them stayed with me until he couid do good mechanical work, but had learned little or nothing of operations at the chair, and then left me. The other stayed for a while, and I told him he would never make a dentist, and he went to some one else. He is now practicing, and has hard work to make both ends meet.

DR. WILSON: I have listened, not only to the address of our president, but also to the discussion that has followed, with a great deal of interest. I have been in the profession sixteen years, and during that time have had five students. Two of them are graduates of eastern colleges, and are an honor to the profession. The others I cannot speak so well of. I advised them not to enter practice until they had graduated, but poverty came in the way, and they are practicing without a diploma.

I think the proper place for the student is in the dental college, not in the dental office. But we cannot always say who will and who will not make good dentists. I know of one who was told that he would never make a dentist, and was advised to get out of the business as soon as possible. He said: "I will show you." To-day he is a successful dentist.

There is one point in the address I take exception to.

Dr. Dickinson recommends that the standard for membership in this society should be placed higher. I differ with him on that question. This is not a dental college. We are not granting diplomas; we are here to benefit one another. I don't believe it is best to raise the standard for membership so high. I think by doing so, we will keep out a great many of our very best young men. They don't want to come here and be rejected, and yet they are ambitious. I think we should look more at the man if he is of the right kind of material. I know of young men who wanted to come here this year, but were afraid they would be rejected. They are good

young men, struggling hard, and they would not do an unprofessional act if they knew it.

Our president made one remark to which I could not resist applauding. I should like to see our old practitioners—those that are qualified, and have been practising for many years—men who are much better qualified than I am, men that I look up to and honor, have the privileges of graduates. I hope the day will soon come when they will enjoy such privileges.

DR. DICKINSON: I am inclined to think Dr. Wilson does not exactly get my idea. I was speaking especially of the standard which should entitle one to recognition as a professional man. It cannot be denied that the more one *knows* the better for him, and, consequently, for his patrons. To this end, then, let us *insist* that those over whom we have any influence, shall not enter upon practice until they are *qualified* with all the term implies.

The whole tenor of the address, I will admit, implies that we should have a much higher standard of qualifications than heretofore.

It is a fact, that many worthy young men come here who would not be admitted if the standard was higher; and it sometimes acts as a spur, if a young man is rejected. One came to me at Iowa City, and said: "I am glad I did not pass the committee; the incentive to further study and preparation is greater now than it would have been had I been received." The next year he came up and was passed. That expression I have heard more than once.

It should be considered an honor to be a member of this society, I certainly so consider it, and hope all of us do.

DR. INGERSOLL: This makes me feel a little ashamed of my work last year. I don't want to be on the examining committee again. As I was made the mouth-piece of that committee I said to those fifteen applicants for membership: gentlemen, we do not expect you to have acquired all there is in dentistry; but what we do demand of you is this, an honestly-expressed desire to become dentists of the best skill and standing, and a wish to use this society as a means for the accomplishment of that purpose. We want to know that when you come into this society as members you come for mutual improvement and with the purpose to do honor to this

society and to maintain the high standing of the profession in the State. To this they all assented, and where are they to-day?

DR. W. O. KULP: Before the last constitution was gotten up the subject was thought over and discussed and a provision made for just such cases. Our object was to have only qualified men—men that would be an honor to the profession. Therefore, we had two classes of members, junior and senior. Those who came in last year were perhaps proper subjects for junior membership. On this point I think the constitution has been violated ever since it was made. If the letter of our constitution had been carried out, our society would undoubtedly have been better than it is to-day. If we continue in this reckless way it will break up our society. There is another point I cannot refrain from touching upon. We, as Americans, go to extremes. We have been in the extreme in admitting young men into the office and teaching them dentistry.

We have a man in our town who regularly turns out three or four dentists every year. One of them went to a Philadelphia college one session, came back, advertises the fact, and is now practicing.

While I heartily despise that manner of manufacturing dentists, I also caution against the other extreme. It is not possible for a young man to go to college about two sessions and come out a full-fledged dentist. He may be qualified as far as the mental examination goes, but he is not a dentist fit to be trusted. I would say to them: You are welcome into my office if you have proper natural qualifications, and I will direct your studies for a certain length of time and assist you in various ways; see how I work, how I treat people, how I talk to them, so that you may take practical lessons. *Then* go to college, and when he comes out he has already had some observation to enable him to apply what he has learned in college. Let us be careful and not go to either extreme. I do not believe in encouraging a man who has not a proper foundation, either in education or natural ingenuity. He must be able to grasp the whole subject, and should have ingenuity enough to become a dentist, because a dentist must be a genius.

There are men that are eminently qualified in knowledge that cannot compete with those men who have knowledge in their fingers.

DENTAL EDUCATION.

An excellent paper on Dental Education was read by Dr. A. O. Hunt, of McGregor, in which he gave a review of the work that has been done, and that which is now being done by those who are directly engaged in dental education. He alluded also to the "New Departure," declaring it to be dangerous to the best interests of dental progression, and tending towards a lowering of the standard now prevailing in operative dentistry.

He presented in strong light the lack of an intelligent appreciation, by the public, of the necessity for and the benefits to be derived from dental operations when skillfully performed. A considerable portion of the paper was devoted to the subject of popular education upon the importance and value of dentistry, and elicited the following

DISCUSSION.

DR. INGERSOLL: The subject of educating the people in matters pertaining to dentistry, to render them more intelligent in regard to dental practice, has exercised the minds, spasmodically, of a goodly number in the profession. Several methods have been adopted, such as the publication of periodical journals, small pamphlets published by dental societies, or put forth by individuals for distribution among their patients, and containing plain instructions for the popular mind, pertaining to the dental organs. Some have written from time to time short articles for the newspapers to inform the people generally of the nature of dentistry and dental practice. But all these methods have one by one been abandoned. Yet the idea of enlightening the public, or at least that portion of the public who are the patrons of dentistry, has not been abandoned.

It is done quietly and privately in the dental office. Here is the place where it can be done effectually, and where every dentist can do his share of the popular enlightenment. Talk—sincere, earnest, plain talk—not talk that conceals some pretended secret, but talk that explains everything and conceals nothing. I have no secrets in dentistry that I desire to conceal from my patrons.

I took it into my head once to write out some of my talks at the chair with my patrons. I will give you one or two examples of my method. Last Sunday a man came in from the country, ten miles

bringing his two daughters to my office, one to have a tooth treated and the other to have a tooth extracted. When he paid his bill—50 cents, for extracting the tooth—he said, "How is it that you fellows charge so much for what you do in a minute, when I can hire a man to work on my farm all day for a dollar?"

I will tell you why. "Suppose you have a bushel of a rare kind of wheat, the only wheat of that choice variety to be found in the neighborhood; all your neighbors want it; a thousand men are eager for it, would you sell it for a dollar—the price paid for a common article? You would be likely to sell it to the man who would give you the most for it, wouldn't you?"

"I think I would," said he.

"The scarcity of the article would greatly increase the price. Now, how is it about dentistry? In coming to Keokuk you have passed a thousand men, any one of whom could do that work for you on the farm; but you would not trust *one* of the thousand men to extract that tooth for your daughter; but you came past all of them, and came all the way to Keokuk to find me as the only man in the neighborhood whom you would be willing to trust. Does not the scarcity of the article control the price? And ought I not to have charged you ten dollars instead of fifty cents? If so, you are in my debt nine dollars and a half."

With a significant smile, he said: "Come, girls, let us go."

ALVEOLAR ABSCESS.

BY L. C. INGERSOLL, KEOKUK.

Photographed in your minds I think I see this picture—a swelled face, distorted features, an agonized countenance and a discharge of matter as from the crater of a boil. The picture changes—the swelling goes down, the painful expression is gone, the features are restored, and even the mouth presents its wonted aspect, except that an opening is left on the gum through which slowly oozes, at intervals, purulent matter. This is *alveolar abscess*. These two pictures present only the external aspects of the case; and this to the non-professional mind is all there is of our subject. But it is a seriously diseased condition, demanding a cure. To attempt a cure, as is sometimes done, by treatment aimed at suppressing the symptoms,

would be as far astray from the right course as to attempt a cure of a disordered and foul stomach by cleansing the teeth with a newspaper advertisement of "fragrant sozodont." As dentists, proposing to treat a case of *alveolar abscess*, we need first to get a clear perception of the location and the nature of the disease; also the different forms of disease arising from the same cause, which, from their resemblance to each other, are often mistaken for alveolar abscess, and treated as such, though usually resulting in failure. All formation of pus about the roots of pulpless teeth is not an indication of alveolar abscess. It must be borne in mind that the same cause may induce a variety of forms of disease, varying with the variety of circumstances under which the cause operates. Hence, when we speak of alveolar abscess, we need to discriminate between the different forms of disease located in the alveoli, and having similar manifestations.

To include all these in a single essay and on an occasion like this, would occupy too much of your time and weary your patience. However clear may be the apprehension of the profession concerning the origin and development of pus about the roots of teeth, from the varied treatment adopted by members of the profession and published in our journals, and the varying results of such treatment, it is evident that there is great confusion regarding the pathology and therapeutical aspects of the whole class of diseases known by a common name, *alveolar abscess*.

There is a tendency with all persons who apply themselves to the cure of disease, to adopt specifics, to elect a remedy which shall always and with uniform effect be applicable to any specified disease or class of diseases having a common origin. The popular mind is full of this notion, and the scientific mind is strongly tinctured with it.

This is a *natural* tendency, and, therefore, to a certain extent right. But infallible rightness in this direction can only be based on perfect knowledge of all natural laws and of all possible departures therefrom. We may regard what is called the theory of specifics, the *law* of specifics. For it is undoubtedly true that every form of disease may be counteracted in good measure by *some* remedy if only applied at the right time and in the right way. But to do this

requires a perfect knowledge of the disease and its every conceivable aspect, and a perfect knowledge of all counteracting remedies.

The evil of this tendency to use specifics is discovered in the habit of some, perhaps I may say *many* practitioners, to fall into a routine practice—to treat every disease that they can classify under a popular or scientific name with the same unvarying remedy, which they with most approving confidence call "their method." I once heard a druggist remark concerning a reputable physician, that to put up his prescription in case of any miasmatic disease, all he needed to know was whether it was prescription number one, number two, or number three, for they were always the same, and in the same order. So of every other disease he was accustomed to treat. Of course, it was incumbent on the patient to bring to him for cure the exact form of disease that was curable by his remedy.

Although such routine practice may be very unscientific and unwise, it is not wholly nonsensical, for there is some measure of rightness in it. The tendency to adopt a remedy and to persist in its use, is the result of a misconception of the nature, modifications, progressive stages, and many varying manifestations of disease, under an almost endless variety of outward circumstances and physiological conditions, although arising from the same cause.

The simplest dictate of common sense, as well as science is, that disease must be treated in every case according to its nature, and not according to its name.

There is a very grave practical mistake in calling all disease located in the alveoli and accompanied with swelling of the external parts, *alveolar abscess.* Still another mistake is made in supposing that if there is added to these conditions a discharge of matter, the disease must certainly be *alveolar abscess.* Among the former class may be named, tumefaction of the peridental membrane, and induration of the gum; among the latter, necrosis of the root or of the paries of the alveolus, ulceration of the root membrane, and a deposit of lime salts about the apex of the root which can be nothing else than sanguinary calculus. Again we meet with encysted tumors which have so markedly the appearance of alveolar abscess as to be readily mistaken for that disease.

Among all these resemblances of different diseases, originating

primarily in the same cause, it is essential to the treatment that we note well the differences as well as the resemblances.

The limit of this paper will not permit me to enter into the pathology of so many forms of disease as I have indicated, though allied to my subject; wishing only to put my professional brethren on their guard against naming and treating every disease of the alveoli, with or without the discharge of pus, as *alveolar abscess*.

I do not, however, wish in this connection to fall into the mistake myself of ignoring the progressive stages of disease, or of supposing that it must complete the entire course of its manifestations before it may with diagnostic propriety be distinctively named.

I desire now to take you out of this confusion of my subject, and separate from things that resemble and things that differ, a definite form of disease about which there can be no dispute as to its nature or its name, and present before you a *rationale* of treatment.

I shall define it thus: A disease located within the alveolus and upon the root of a tooth, which, in its development, produces pus, then forms a tube or canal leading out through the mucus membrane of the mouth, or externally through the skin, through which tube the confined pus is discharged. This, you will all admit, may rightly be called alveolar abscess. I wish still farther to limit my subject to this development of disease located at the apex of the root, with its sack of pus closing around the apical foramen.

By keeping in mind the foregoing definition and limitations, we may discuss the subject with more clearness and profit.

Let us consider first the pathology, then the treatment of the disease. It is palpably evident that an abscess cannot be located as I have described, without a previous death of the pulp. An abscess surrounding the apical foramen must cut off all nerve and vascular connection of the pulp with other vital parts; and this means death. The inflammatory conditions which mark the initiation of the disease may first be manifest in the root membrane, or first in the pulp. While it is usually the case that a tooth pulp dies from exposure caused by decay of the hard tissue that surrounds it, or the irritation of a filling, it sometimes dies without decay or exposure. After death it undergoes decomposition, and becomes a mass of putrid matter confined within the pulp chamber and root

canal. If the opening through the cavity of decay is free, this decomposed matter may escape, and not be productive of abscess. But if it is closed, as it usually is, with particles of food and demineralized dentine, it must remain a source of irritation and disease to contiguous parts. It may always be assumed that a pulp never dies a spontaneous death without exciting inflammatory action in the root membrane around the apical foramen. This, therefore, being a condition existing at the time of the death of the pulp, it is still farther excited by the irritating presence of the putrescent matter formed by the decomposition of the substance of the pulp.

The capillary vessels become engorged with blood, circulation through them is impeded, some of them burst their coatings and add to the waste matter already accumulated; severe pain ensues, caused by pressure of this waste matter on the nerve fibers, and greatly added to by the expansive force of the gases evolved in the decomposition, and by this destructive process enough of the poison of dead matter is generated to cause the death of the patient unless it can in some way be disposed of without entering the circulation.

Here the protective power of nature comes in to rescue life from destruction. This is accomplished in one of two ways. There is always waste dead matter enough in the body to cause death if it is allowed to remain. Nature has provided two methods for its removal. One is by a general system of absorption, through which all the waste of the body, excepting excrement, is disposed of, and this waste may be said in general to equal in amount all that is taken into the body daily as nutrition. When from any diseased condition there is accumulated an unusual amount of waste matter, the absorbents are excited to their utmost capacity of performance. If this process succeeds and thus gives time for the life functions to regain their wonted vigor, health of the parts is restored. In case of alveolar abscess, when disease is tending in this direction, under favorable circumstances the accumulation of waste matter may be so slight that it will be readily disposed of by absorption and thus an abscess be prevented, although the pulp of the tooth dies. But if the pulp of the tooth be large and go into decomposition rapidly—too rapidly to be absorbed and disposed of functionally, nature has provided another way to protect herself from this poison, which, if left to remain, would infiltrate into surrounding tissue and ultimately

cause death. A sack is formed about the root of the tooth, beginning in the root membrane that covers the apex, into which this purulent matter is securely gathered—the absorbents meanwhile doing their best. But when "worst comes to worst," the sack continuing to expand, the surrounding tissue being absorbed to make room for it, the pressure on the nerves is so great that none but those who have experienced it can know its severity.

At this point nature undertakes the work of expelling this foul matter from the body. This is done by forming a tube, leading from the sack in which the matter is confined, out to the surface of the mucous membrane or of the skin, where the matter may be discharged. You will observe that by the formation of this tube, contamination of surrounding tissue is prevented, and the matter safely conducted to the surface. Otherwise it would be like the overflow of a cesspool in the city. This tube is the underground drain to carry off the filth and protect the population. In the formation of this tube it of course starts out from the sac and the hard work is encountered at the start, for the bony walls of the alveolus must be penetrated. The gases generated in the decomposition of matter, press with all their expansive force, the absorbents are excited to great activity, and the process of perforating the bone is accomplished with the severest pain that attends the formation of abscess. When once through and into the soft parts, the yielding nature of the tissue is such that the severity of the pressure ceases, and with it the severity of the pain. Hence, it is commonly observed that by the swelling of the face the pain is relieved. I have been thus particular concerning the process of the formation of abscess for the purpose of getting clearly before the minds of the younger practitioners the abnormal conditions to be removed—the true nature of the disease to be cured.

As we come now to the second part of the subject—treatment—I wish first to answer the question, what is a cure? as it is greatly to be feared that there are mistaken notions on this point. It is no doubt true that many an abscess is supposed to be cured which is not cured. Both patient and practitioner may be deceived. Pain is so commonly an attendant of disease that it frequently happens that the patient will report the disease cured when the swelling has gone and the pain has ended, and sometimes the operator is too

willing to believe the statement. Remembering the progressive steps of development of an abscess, and that cure is a retrograde progress, we sometimes come, by treatment, back to the same conditions that were early seen in the development—a condition when the absorbents can dispose of the matter formed, so that the sinus on the gum is closed up. This, too, is a condition calculated to deceive. All that has been accomplished is the reduction of the abscess to a condition of quiet favorable to a chronic state. Though it is no longer in active flow, it is in a condition to break out again so soon as the functions of absorption shall from any slight cause be disturbed. An abscess may be reduced to a hypertrophied or indurated condition of the parts involved, and yet not cured. These deceptive conditions arrived at in the progress of cure are but half-way cures, and are usually the result of half-way treatment by easy and quick methods, or by wholly wrong methods.

A cure of alveolar abscess not only arrests pain, and the discharge of pus, but removes all swelling, soreness, looseness and tenderness of the tooth, restores the normal color of the gum and prevents the return of these conditions on slight constitutional disturbances.

To accomplish this, the whole abnormal structure of the abscess must be broken down. The whole machinery of pus formation must be demolished and normal tissue be restored. For the disease is not, as some have supposed, functional, but it is structural. Cure is not, therefore, simply removing the cause of irritation and giving free action to normal functions.

I have been astonished more than once, that men in the profession, of great practical skill and experience, should have adopted the theory as a fundamental axiom in therapeutics, that if you remove the producing cause of disease the inherent power of nature will restore health to the diseased parts—or, as is sometimes said, "The disease will cure itself." In conformity with this notion, they say concerning alveolar abscess, that if you will remove the dead tissue of the pulp and all foreign putrescent matter from the pulp chamber and from the root canals, and close their openings by an impermeable filling of any sort, nature will take care of the rest—the disease will cure itself.

Within proper limits the application of this principle would be correct practice. In functional disease it may well apply. But

abscess is not a functional disease. It is organic and structural. The formation of a sack is an organization of new tissue; it becomes organized structure with abnormal functions. With a structure and functions the organization has power of continuance, though the producing cause ceases to exist. It is as truly an organized structure as any bodily excresence or tumor. Tumors are not gotten rid of by removing the cause.

I was applied to within the past year to remove from the lip of a gentlemen a tumor that had been of slow growth for twenty years, caused, as I judged, by smoking a heavy pipe while engaged at his daily labor as a bricklayer. The constant motion of the head and swaying of the bowl of the pipe was a source of irritation. Suppose I had said to the man, sir, you must remove the cause and your lip will get well—you must throw away your pipe, and the tumor will go too. He had virtually removed the cause years previous, being compelled by the soreness and pain of the tumor, to smoke his pipe from the other corner of his mouth, but the tumor did not depart. I removed it, however, while he continued the use of the pipe as before.

What we need in the treatment of alveolar abscess, is a rational method which will take cognizance of its true nature, and carry with it a measure of certainty as to effecting a cure, and not leave both operator and patient in perpetual doubt as to the result.

All methods and means which have been adopted by the profession may be resolved into two; one surgical, the other therapeutical. One operator destroys the sack by mechanical means, cutting and dissecting it away, and another destroys it by caustics, while a third will employ both methods in conjunction. Both methods have proved successful, and both have proved failures. In each case the failures have been from want of thoroughness, except in cases complicated with other forms of disease. It is conceded that a caustic like carbolic acid, a saturated solution, will destroy the sack containing the pus of an alveolar abscess. The only question pertains to the manner of applying it. It is also conceded that the operation may be performed surgically; the question in this case being, whether the operation shall be performed by cutting through the alveolar wall to the apex of the root, or by extracting the tooth, dissecting the sack from the root and replanting the tooth.

My own experience in the treatment of alveolar abscess for a period of twenty-six years, as it illustrates many successes and failures, may be as profitable to others as it has been to me, in leading to a simple and reasonably certain method of treatment.

My first case was an abscess located on the su. cen. in. I resorted to the usual method of practice—excavated until I reached the pulp chamber, which I swabbed very freely with creasote. Nerve broaches and instruments for entering the roots were not then in general use. This treatment had the effect to relieve the pain, and lessen the discharge of pus and the general inflammatory symptoms. But I found that omitting the treatment for a week would bring a return of the aggravating symptoms. Then I extemporized an instrument to ream out the root and introduce the medicament higher up; but with no better results. I tried the application of counter-irritants to the gum, hoping by this means to stimulate absorption of the pus or bring the disease to the surface, where I could more easily control it. In this I failed. At last I concluded to treat it as I had seen fistula treated, with a seton. I made two parallel vertical inscisions through the gum overlying the apex of the root, dissected up the intervening portion of the gum and drew through under it a twisted bit of cotton. This I moved or replaced from time to time, till at length I removed it entirely, and to my delight, the next time I saw my patient the abscess was gone, and it did not return. With supreme satisfaction, I said to myself: I have now found a sure method for treatment of alveolar abscess. With my next case I was very confident. I was confident of this—that I knew how to begin and how my beginning would end. The "heroic method" was entered upon with the enthusiasm of "bearding the lion in his den." I pursued my treatment with the seton till I became satisfied that it would not be successful. I abandoned it. I had read somewhere of somebody cutting through the alveolar walls and applying creasote there at the very seat of the disease. Had I always known just where to find the seat of the disease and known also that I had sufficiently mangled the sack to kill it, or that the applied creasote had reached every part of this abnormal tissue to destroy it, I might have found this method a great success—provided my patient would submit to so painful a

method. But as it was, the treatment was only occasionally successful.

Next came in use the syringe, forcing medicines, in stimulating or caustic strength, through the root of the tooth, or through the sinus and fistulous opening. But in nine cases out of ten, I found my fluid regurgitating around the nozzle of my syringe and none of it entering the sack, but deceiving me all the while with the idea that *probably* enough had entered the sack to accomplish the desired purpose. Better syringes and more effective methods of using them are now employed by those who trust to the syringe in the treatment of this class of cases. But still the fact must remain that the sack must first be emptied of contained pus before any other fluid can enter; and it cannot be thoroughly emptied through one opening. There must be an opening of egress as well as ingress to the sack, to have a condition favorable to certain success. Any method of treatment by caustics, that does not provide for first emptying the sack and also for bringing the caustic with certainty in contact with every portion of the surface of the sack, is faulty, and may often prove a failure.

Having failed, in my early experience, with so many methods, I began to reason about the case thus: The abscess sack is a living, abnormal tissue which must be destroyed. I have at hand pure wood creasote (carbolic acid was not at that time a pharmaceutical preparation), chloride of zinc, and nitrate of silver. Nitrate of silver is objectionable because of its action upon the tooth substance. Chloride of zinc is objectionable because of its being a powerful irritant and too persistent in its escharotic effect, causing very great pain and endangering surrounding parts. I adopted the use of creasote, pure, or combined in some cases with an equal quantity of tinct. of iodine. This must be brought in immediate contact with every part of the sack. I have tried every coaxing method and have failed. I have tried the force of the common syringe, and have failed so often as to feel forever in doubt of success. I must make a different application of force, such as will bring the caustic in contact with the entire inner surface of the sack. This seemed to me the only rational idea. I resorted to the following simple method which I have followed ever since. It is this:

I first gain free access to the pulp chamber. If I cannot get it through the cavity of decay I plug up temporarily this cavity and drill in through the crown. I aim to drill in such manner that I shall form a tube about the size and style of a tube for setting a pivot tooth. This tube so formed, I make the barrel of a syringe. Out of the remainder of the root I form the nozzle of my syringe—requiring only to see that it is free from solid matter and open at the apex. This is so usual a condition of the root of a tooth having abscess, that I test the working of my syringe with water. If I find it free, I proceed with the treatment; if not, I take a jeweler's hair broach, draw the temper to a spring, pass it up the root, and ream out the apical foramen. If the root canal be too tortuous for this operation, after the first or second trial in forcing caustic through, the opening will in almost every case be found free. To put this extemporized syringe into use, my first effort is to empty and thoroughly wash out the abscess sack; for the pus, remaining, prevents the entrance of the caustic, and while it bathes the inner surface of the sack, the entrance of the caustic coagulates the pus on the surface and prevents the full action of the caustic. Hence I fill the root with warm water, apply to the opening a bit of soft rubber, whittle a stick of tough wood for a piston, and force the rubber up the tube formed in the tooth as the barrel of my syringe. Thus the water is forced into the sack, and by the same process the pus is forced out through the fistulous opening and the sack itself on its inner surface, left clean for the action of the caustic.

The caustic I usually employ is carbolic acid, a saturated solution of the crystal. After applying the rubber dam to protect other parts of the mouth, I force the carbolic acid into the sack in the same manner as I do the water. When I see it making its appearance at the sinus on the gum, or externally on the skin, I am sure that the sack has first been filled, and that its inner coating has been freely bathed with the caustic. In some cases a single thorough treatment of this sort will effect a cure. But in many cases it will require at least three treatments at intervals of two or three days. Then I leave the case for a week or ten days as a test of the cure, closing up the cavity with some temporary stopping.

This method of treatment can be highly commended for its rational simplicity, for its thoroughness in reaching the seat of the

disease and accomplishing all that is possible to be accomplished with caustics, and for its ready adaptation to all classes of teeth, molars, as well as incisors, in both jaws.

It is not usually necessary to know on which of the roots of a molar, the abscess is located. If the caustic used is well confined within the tooth and the piston or plunger be well adapted, the force employed is quite certain at the second sitting, if not at the first, to drive the caustic through the abscess on whichever root it is located.

The treatment of alveolar abscess has in the last few years gained considerable attention by the introduction of a new abscess syringe, adapted to performing the operation through the sinus on the gum, or by an artificial perforation of the gum and alveolar wall. The syringe is a great improvement on those before used. But all operating with the syringe through the external opening I consider unphilosophical and uncertain, when the case is one of true abscess as I have described. When complicated with other forms of disease, such as I have before mentioned, necrosis, ulceration and deposit of sanguinary calculus, it may be an important aid in treatment.

This latter condition named, leads me in closing, to call your attention to the distinction between ulceration and abscess. The two are widely different. Abscess has a sack; ulceration has no sack. Abscess has a vascular, organized tube, to drain the sack of pus; an ulcerated tooth has no tube-drain. An ulcer is phagedenic; an abscess is not. An abscess is an organized structure; an ulcer is structureless. In the development of abscess new tissue is organized; in the development of an ulcer normal tissue is disorganized and wasted. Being so widely different, it seems strange that the two conditions should be mistaken the one for the other, or more often considered to be the same disease. Ulceration in connection with the root of a tooth attacks the peridentium and the walls of the alveolus, destroys and wastes away these tissues. The wasting of the cementum by ulceration is often supposed to be absorption of the root. All three tissues may not show the phagedenic character of ulceration in the same and every case. It is plain that ulceration requires a different treatment from abscess.

Here let me also call your attention to a peculiar condition sometimes found on ulcerated teeth—a deposit of calculi. Granules of

tartar are clustered about the apex of the root, or distributed along the route of the discharge of serous matter. I am not aware that the authors of our text books, or writers for any of our journals have ever given any account of this peculiar deposit which has distinguished it from other calcareous deposits on the teeth. It seems to have been taken for granted that all calculus found in the mouth, and certainly all deposited on the teeth, has its origin in the saliva, and has therefore been called salivary calculus. We need but to ask the question: how does the saliva reach the apex of the root of a tooth, and in such quantity that in the slow process of such deposit the calculi could be formed?—to see at once that it is impossible. Thus we shall be led to seek some other origin for the deposit. Let it be remembered that all the fluids of the body contain calcareous matter. Hence we have not only salivary calculus, but urinary calculus, biliary calculus, gall calculus, etc. And this is pre-eminently true of the blood. Hence, in the decomposition of blood as in the formation of the serum of an ulcer, the lime salts, contained in the liquor sanguinis are freed to seek their affinity, and being in contact with the like mineral composing tooth bone, a deposit takes place. Being thus formed from the aqueous portion of the blood, I have called it *sanguinary calculus*, as indicating its true origin.

When such is the condition of a tooth, to make the diagnostic mistake of calling it alveolar abscess, and treating it as alveolar abscess, inevitably results in failure. I have only to add, in one closing line, mark well the distinctions I have attempted to make.

DISCUSSION.

DR. W. O. KULP: There is one thing in the paper I wish to take exception to, because Dr. Ingersoll made it so very explicit, and that is in regard to the cure of alveolar abscess.

In my experience of the last twenty years, I have known of a great many cases where alveolar abscess has been cured entirely, by simply removing the cause of it and filling the canal at the first sitting. Now I should not hesitate to remove the cause and expect a perfect cure with no application. A great many times nature does the work.

While I see that a great many good results may be brought about

by using nothing, or by simple remedies, still I should not advise anyone to rely entirely upon these. Another point on which I do not agree with the doctor, is his definition of abscess and ulcer.

Ulcer is merely another and a later stage of abscess. Time was, years ago, when I treated alveolar abscess in a different way from what I do now. My remedies were the same; my ways of getting at it were the same; but the time consumed in the treatment is shorter. Very often I do not expect a patient to come more than once.

If there is no soreness or inflammation, I should not hesitate to clean out the tooth thoroughly, prepare it for filling, then inject my remedies and immediately fill, expecting a cure.

I was forced into this method by treating patients from out of town, who could come but once, and I adopted that mode eight or ten years ago. If the operation is thoroughly done, I am satisfied the cure will be perfect.

Of course, if the tissues were in an inflammatory condition, I should use other treatment, but I speak now of chronic alveolar abscess caused from the presence of dead pulp tissue in the canal of the root.

DR. SPALDING: Dr. Ingersoll's view in regard to the origin of tartar around the root is to me a new idea; I think it, however, well founded.

In regard to alveolar abscess proper, I would not limit the definition as Dr. Ingersoll has done. I have had, like a great many others, many annoying failures in former years, and for the reason that has been given by Dr. Ingersoll; we did not have a rational understanding of the conditions. With regard to the conditions, we may always safely conclude, that wherever an abscess exists, there is an abscess cavity of greater or less extent; that is to say, there is an artificial cavity produced by the abscess. Now, that condition may vary greatly—that is, this cavity may be very small, as it is at the first beginning, when only a small portion of the structure has been broken down.

It may be a very small chamber around the apex of the root; it may have expanded larger and larger, and it may have become much more extensive than practitioners have any idea of, unless they have investigated the subject pretty thoroughly. It is not a

very uncommon thing to find an abscess cavity as large as the end of your finger, and sometimes as large as the end of your thumb, and some no larger than a pea, and so all the way up and down. Now that is the condition we are called upon to treat, very often at the first view we have of the case.

One case of that kind came to me that resulted from the improper filling of a lower incisor.

The gentleman had been suffering a year and a half and yet there was no fistulous opening; that is, none that was recognized as a regular canal. The accumulation of pus had been considerable at times, but it escaped occasionally along the line of the root.

I of course endeavored to determine the extent of the abscess cavity, but was unable to do so. The foramen at the end of the root was not large enough to make an examination through it, so I endeavored to explore along the side of the root, but without success. I endeavored to treat through the root, but with no good result. I then resorted to another method. I made a free opening through the gum and alveolar process. There was no previous opening through the process in this case, but on entering the abscess cavity its size surprised me. It was fully one-fourth of an inch in diameter, and the depth of it was nearly twice as much.

Now, what did I do after opening the cavity? Nothing! absolutely nothing! only to remove the *debris* caused by the drill. I was satisfied I had established drainage. I had got very near the most dependent portion of the abscess cavity, and in order that drainage should be maintained, I inserted a tent to prevent closure, and the tooth never gave a moments' pain afterward. It was subsequently examined and no abscess cavity could be discovered. It was evidently filled by deposition.

The idea too often prevails that if pus accumulates a sac must exist. I believe the sac to be only a modification of the tissue already existing. I don't believe in the existence of a pyogenic membrane, whose office it is to secrete pus. I regard pus as an accumulation of elements of the blood, that have escaped from the blood vessels. There is no other source than the blood. When the metamorphic condition of the tissue that is recognized as the wall of the sac, has not been established the only treatment necessary is to provide for perfect drainage. The pus corpuscle is the white blood corpuscle.

There is no pus corpuscle *per se*, and the ease with which these blood corpuscles escape from the blood vessels where there is inflammation, is surprising. The condition of the fluid contained in this cavity is the point. When it first accumulates, it is composed of plasma, white blood corpuscles, and probably lymph. These contain elements of nutrition, and if drained away before decomposition takes place, the whole difficulty is remedied and the cure is spontaneous. The more treatment you give a case of that sort, the worse you make it. When we come to talk about cures, we should remember that "nature performs all the cures," and all we can do is to discover the pathological conditions and correct them. If nature cannot overcome the pathological condition, we must break up the arrangement that produces it.

It is often necessary to do something to break up the abnormality. This abscess cavity must be re-filled by deposition, or a cure is not affected. So long as the abscess cavity remains, so long there is no cure. Therefore, to effect a cure, you have not only to relieve the soreness and inflammation, but the osseous structure must be restored.

All we can do is to provide the opportunity for the physiological forces to do their work.

DR. HUNT: I would like to ask Dr. Ingersoll if I understood him rightly, as saying that if the soreness was removed he considered the abscess cured?

DR. INGERSOLL: Yes, sir; if there are found the conditions which I have named—the gum restored to its natural color, the swelling or fullness of the gum gone, and the soreness of the tooth removed—I consider the abscess cured.

In further reply to Dr. Hunt, let me go over a bit of personal history. Four of five years ago I had an abscess treated after the manner of those who believe that a thorough cleansing of the root canal and immediate filling to the apex is all that is needed in any mild case of abscess. Mine was a mild case, and one of not long standing. I had no confidence in the theory as regards a fully established abscess, but I had confidence in the gentlemen who declared that they were successful with this treatment, in mild cases, but I believed also that they were mistaken with regard to many cases which they had pronounced cured. The

next year when I exhibited my case in the presence of a large number of the members of this Society, it was pronounced cured; but I knew that it was not cured, and it remains uncured to this day.

DR. WILSON: Are we not able to tell with instruments, whether or not a cure has been effected?

DR. INGERSOLL: Ah, yes, in some cases. But you know how difficult it is to learn the correct condition of a tooth from the declarations of a patient. Time after time have I had patients who would tell me that an abscess was cured, when all you had to do was to press gently above it, to cause the pus again to flow. They do not know whether they have toothache or not. A man who has not groaned and sworn all night, wandering about the house barefoot, don't know that he has had toothache. And a woman who has not gotten up in the middle of the night and applied to her tooth "eleven different *ingregiences*," don't know that she has had toothache. That is, persons occupied fully with the cares and business of life, do not take note of their slight ailments. It needs the attention of the mind, guided by thoughtful intelligence, to report correctly any bodily experiences. I am not ordinarily conscious of the abscess in my own mouth; but whenever I turn my attention to it, I know from the congestion and gentle throbbing, that all is not right. This is not imagination, but a careful analysis of the case. With many a patient, pain is the only evidence of disease.

DR. KULP: I don't know how Dr. Ingersoll's case was treated, but he says when he has his mind attracted to it, it gives him pain. In my younger days an accident happened to me which cut my lip through, and at the same time cut my scalp. Last night I was very nervous for some reason. After I laid down I had most distinct pains in my lip and head. I have no doubt that wound is healed, yet I have often had these sensations.

Now perhaps his tooth does not assume its normal condition exactly; there is something there that is foreign to what it was before the abscess occurred. There is no reason why he should not have a sensation there, notwithstanding the abscess was cured. I say the abscess is cured unless there is some discharge.

DR. INGERSOLL: It may be thus cured for three months, and then not cured for awhile, and have a succession of like changes—discharging pus only at intervals.]

DR. KULP: How was the treatment carried on?

DR. INGERSOLL: Carbolic acid was forced entirely through.

DR. KULP: At the late meeting of the Illinois Society, Dr. Brophy, of Chicago, read an essay and gave some experiments. They seemed to show that carbolic acid was better than creasote. In my experience I never have been as successful with carbolic acid as with creasote and iodine. I claim to be successful ninety-nine times out of a hundred, if I can inject iodine and creasote entirely through canal and fistulous opening.

DR. SPALDING: In regard to the blood corpuscles, we know that the red are much smaller than the white, and yet when inflammation is present, the white are the first to escape. One reason for this is, that the white corpuscles move along in contact with the walls of the blood vessels, or nearly so, while the red corpuscles occupy a central position in the blood column. The latter are the more vital, and are not easily diverted from their axial position. The plasma and the white corpuscles are in the periphery of the column, and while the plasma moves in a continuous current, the white corpuscles move by stages, and creep along the walls of the vessels, being thus held in a state of readiness to enter any enlarged cellular interstice that may present itself. These interstices may be many times smaller than the normal diameter of the white corpuscle, but owing to the great elasticity of the latter, it is capable of being so elongated as to squeeze through a very narrow space. It is also probable that the white corpuscle retains its vitality longer than the red, when outside the blood vessel; and if this is so, the white corpuscle may be returned to the circulation as a nutrient element after a considerable lapse of time.

If either corpuscle loses its vitality it cannot be restored to the circulation as living matter, and its presence in the blood would constitute pyæmia or septæmia. But the subject is too large to discuss more fully at this time.

Allusion has been made to the use of creasote for almost every condition met with.

We have all been guilty of this habit, and we have to get out of it. We use creasote for opposite conditions, and to produce opposite effects. That certainly is not rational, and it is a habit that dentists have fallen into for lack of study, first, of the pathological con-

ditions with which they have to deal, and next, of the nature and character of the substances they employ.

It is the rarest thing in the world to get good creasote. Not one sample in a hundred is pure. Nearly all contain more or less carbolic acid. We have creasote and carbolic acid mixed; so we have the effects of carbolic acid, not fully of course, but still we have it, in all the creasote we use. I say all, because I believe you would have to examine a hundred samples before you would find one pure. The substance we ordinarily use as creasote, is a mixture of creasote and carbolic acid. We know they are analagous, but one is much more active than the other in certain directions. If coagulation is the only effect you wish to produce, carbolic acid is undoubtedly the best agent; but if you want to produce other conditions, creasote may be preferable.

The great mass of the profession is prescribing and treating this disease in a very blind way. Now as fast as we get any light on this subject let it come out. We have a large work before us before we can fully understand the nature of the conditions we have to deal with, and always choose the right remedy.

AMERICAN DENTAL ASSOCIATION.

FOURTH SECTION.—OPERATIVE DENTISTRY.

[CONTINUED FROM PAGE 520.]

DR. C. S. STOCKTON, of Newark, N. J., did not think that a young man who came here to learn something on the subject of filling teeth, would be much benefitted by this discussion, and doubted if he would go away with more knowledge than he had when he came. A practitioner accustomed to the use of soft gold only, cannot use cohesive gold with success, nor can one accustomed to use cohesive gold only, successfully use soft gold. This is not as it should be; every dentist should know how to use both. In some cases he will find one preferable and in other cases the other. Both kinds of gold have their particular advantages, and frequently both can be advantageously used in the same cavity, the one being united to the other. Has seen excellent operations where soft gold was em-

ployed for the chief bulk of the filling, and cohesive gold used for a facing to give a superior finish. Fillings of this description have been successful where cohesive gold has failed. Soft gold can be properly adjusted to the walls of a cavity in much less time than is required with cohesive. He spoke of the complaint that the prices charged by dentists were too high. He thought dentists were partly to blame for that, and that there ought to be some kind of understanding among the profession on this question. They were intrusted with the knowledge and consequently the duty of preserving these human organs, and should conscientiously work upon the principle of moral responsibility.

The natural teeth should be preserved in the best manner practicable, by a selective use of such materials, and by following such methods, as the operator judged best suited to each individual case.

DR. C. D. COOK, of Brooklyn, N. Y., thought there were cases where some forms of gold properly manipulated, would save, when other forms would not. Fillings usually fail by leakage at the margin, which causes a new decay to start at the point of leakage. Yet this is not the only cause; frequently it is the fault of the patient, who neglects to thoroughly cleanse the spaces between the teeth. Have seen as beautiful and as perfect fillings as I have ever had the pleasure of seeing, undermined by decay from this cause. When teeth have once decayed, some provision should be made to prevent a recurrence, otherwise the best of fillings are liable to fail.

Does not think the subject of fees should be introduced before this association. If a man excels in his profession, he generally finds his skill properly appreciated by those who are willing to compensate him for his superior operations.

DR. ALLPORT said that his position had been incorrectly stated by several gentlemen who had commented on his remarks. He admitted that cohesive gold could be used successfully, but he claimed that a majority of the members of the profession would be more successful with soft gold.

DR. MARSHALL H. WEBB, of Lancaster, Pa.:—The success of an operation depends more on the skill of the operator than on the material used or the means employed. In deep-seated cavities of decay, or in those cases where the pulp is nearly or quite exposed, some stained dentine should be left for protection, and in all these

cases carbolic acid ought to be placed in the cavity to disinfect the carious dentine and coagulate the protoplasm, weeping from the fibers of living matter in the exposed dentinal canaliculi. After this has been done, oxychloride of zinc should be placed in the cavity to act as a non-conductor of thermal currents, after the gold filling has been inserted. Not only should oxychloride of zinc be used for that purpose, but in all crown cavities quite a portion of each large cavity had best be filled in that way. It is better to do this than to endeavor to so place cylinders and pellets as to get close contact with the walls of the cavity. After filling such a cavity up to near the inner surface, or first layer of the prisms of the enamel, or, in other words, covering all or nearly all of the dentine with oxychloride of zinc, it should be so cut away after it has hardened as to give substantial anchorage for the gold. A starting-point should then be drilled, if one of the fissures will not serve the purpose. I do not approve the practice of making so-called retaining-points to hold the filling in place, but a point to start the filling in, ought to be made, in all cases, so that as the pieces of gold are put in position they may remain just where they are placed. Not a single piece of gold should move. If movement of gold takes place after it is put in position, whether that gold be the so-called soft gold or any other kind, the operation cannot but be imperfect in some degree. It has been stated that fillings can be inserted in less time and with less effort with soft than with cohesive gold. That is not the case if cohesive gold is properly used. If large cylinders are used, there is no question but that those of so-called soft gold can be pressed against the walls of the cavity more perfectly than cylinders of cohesive gold, but that is not the way to use any gold. Those who speak of soft gold do not say whether they mean absolutely non-cohesive gold or that which becomes cohesive by annealing. All pure gold is cohesive, and the difference in purity makes the difference in degree of cohesiveness. If gold is non-cohesive, there is something on its surface to make it so. Such gold should not be used, even in the sulci and fissures of bicuspids and molars. There ought to be cohesion between the particles of gold, so that there may be no scaling off as the patient advances in age and the grinding surfaces of the teeth wear away. Heavy foil, especially Nos. 30 and 60, is being, and can be used with entire success; but

neither it, nor any other preparation of gold should be touched with the fingers, or be brought in contact with moisture in any way. The teeth that were filled with soft gold thirty or forty years ago, and still remain in place, have become more dense in structure; and most such teeth would not have been lost even if the cavities in them had not been filled. Many operations are performed to-day that were not attempted at that time; and if we were to examine the fillings that were carefully inserted then, and compare them, thirty or forty years hence with those that are properly performed now, we should find that such fillings are more perfect than those of twenty or more years ago. Cavities in the buccal or labial surfaces should be filled in about the same manner as those in the sulci and fissures, but those in the approximal surfaces, and particularly where the enamel is broken away, there, unquestionably, cohesive gold is the only proper kind to use. In such cases, as in others, there should be some point to retain the first pieces or narrow strips of foil and to keep them in place until the grooves or anchorages are reached and filled, and the whole operation completed. As to decay recurring about the fillings in cavities in the approximal surfaces, I would say that in all cases where calcification is imperfect it is necessary to cut away well out towards the buccal and palatal or lingual surfaces and towards the necks of the teeth, or a little beyond the margins of the gums and so restore the contour of the parts that the margins of enamel may be free from contact with the adjoining teeth, and be kept so by the prominent portion of the gold so resting closely against, or being so knuckled-up to, the adjoining teeth, near the masticating and buccal surfaces, that food cannot wedge between the teeth. If such an operation be well performed, and the margins made free, these edges of enamel will be kept clean by the movement of the tongue or the washing of the fluids of the mouth; the gum protects the cervical wall, and decay cannot well recur.

DR. I. J. WETHERBEE, Boston, protests against the claim that cohesive gold cannot be used in all classes of cavities, and against the other claim made by several speakers as to the superiority of non-cohesive gold over cohesive, for producing and perfecting the best possible fillings with gold. Parenthetically he would say that the softest form of gold is that which has been annealed.

The claim that perfect fillings cannot be made of cohesive gold

is not well founded, and indicates a lack of knowledge or of skill. The chief aim in filling is to exclude moisture, and it is immaterial whether this result is obtained with annealed or unannealed foil. Often, in filling, the walls of the cavity get bruised, or the margins are chipped by the impact of the mallet, either of which may cause subsequent decay.

He insisted that cohesive gold can be as closely and firmly packed against the walls of a cavity by any practitioner of average skill, as non-cohesive.

Retaining points filled with cohesive gold aid materially in preventing the movement of the first pellets condensed. In large approximal cavities, it is advisable to begin with semi-cohesive pellets and change to cohesive when the filling is well advanced. If a space the one-thousandth part of an inch in extent occurs at the margin of the cavity, it will admit moisture, and subsequent decay is liable to follow, and the filling prove unsuccessful. A space of this magnitude cannot be seen by the unassisted eye. To prevent such defects, the filling, after being condensed, should be filed away to say one-forty-eighth of an inch of the margin of the cavity, and then burnished down upon the enamel edge at all points. Uses a heavy burnisher lubricated with soapsuds for this purpose.

Approximal fillings should have a convexed surface, and approximal spaces should be widened so as to favor effectual cleansing. Prefers pellets for the bulk of large cavities, and finishes with annealed ribbons. For small cavities, employs ribbons exclusively, for the reason that they are most portable. Regards cohesive gold fillings as superior to non-cohesive in strength, beauty and durability. That some are not successful in its use, is no argument against its general adoption. There are some cases that will fail in the hands of the best operators. Dr. Wetherbee uses unannealed gold, and anneals after it is made into pellets, cylinders, or ribbons, the pellets and cylinders being surface annealed only, thus leaving them soft and non-resistant.

Dr. G. A. MILLS, of Brooklyn, N. Y., was surprised to see so many patients, coming from the hands of operators of reputation who show such want of attention to proper cleanliness. Dr. Mills spoke of the importance of attending to the cleanliness of a patient's teeth and the health of the mouth. It was an exception that a

patient came into his hands in whose mouth there was any evidence of an effort to accomplish that object. He had been practicing in Brooklyn for four years, and only in one case had he found the marks of such an effort. He considered this fact deplorable, and believed it remained for the young members of the profession to come up to the standard on this point. With reference to the variety of opinions on the subject of the best materials and the best modes of operation in filling, he did not feel like denouncing an operator's system or practice because it was not the same as his own, or because similar means were not employed by each to obtain the same results. But the foundation plank in the successful filling of teeth was, in his opinion, particular regard for cleanliness.

Agrees with the views expressed by Dr. Allport and is only apprehensive that such remarks, coming from a man of his ability, may tend to encourage loose, easy methods of filling teeth. Has used heavy foil successfully and employed no more force in packing it than others use in packing light foil.

DR. GEO. F. WATERS, of Boston: Our work is not done when the tooth is filled. Much of the security of a filling depends on the habits of cleanliness practiced by the patient. He removes soft tartar and places it under the microscope to show the patient the animalcules that live in it, and the vegetations that grow and flourish in a mouth that is not kept clean. He impresses upon them the necessity of cleanliness; or otherwise acids are generated, parts adjacent to the fillings decay, and the best of fillings thus neglected often fail. Dr. Waters related an incident illustrative of the good results of close attention to cleanliness of the teeth. Years ago he was called on by a young man about seventeen or eighteen years of age who asked to have his teeth cleaned. His mouth was so filthy that the doctor declined to operate, but determined to teach the lad a useful lesson. He told him that his clients were very fastidious persons, and if he should apply his hands and instruments to teeth in such a condition as his were, that he would not be allowed to operate for any one else for at least twenty-four hours, and that he would be obliged to spend a long time in scrubbing his hands and his instruments to remove the offensive odor. Twenty-five years after this occurrence a stranger stopped him on the street, and opening his mouth, asked to have his teeth looked at.

A beautiful set of teeth, every one perfectly clean, was presented to view. The stranger informed him that he was the boy who had called on him so many years before, and that the result now seen was the effect of the sharp rebuke he then received. Dr. W. believed that poor fillings in a clean mouth were more durable than the best of fillings were in one that was neglected.

Dr. E. S. TALBOT, of Chicago, presented a set of instruments for reaming out root canals previous to treatment, with the right of manufacture, and explained their use.

On motion of Dr. Atkinson, the offer of Dr. Talbot was accepted by the Association, with thanks.

Section Four was then passed.

JOURNALISTIC.

In the September number we wrote of the position taken by the editor of the "Lancet" on the subject of "Extracting Teeth and putting them back into the Jaw." It will be remembered that the editor wanted information, but from members of "our profession" only. According to the "Medical Press and Circular" from which the following extracts are made, he got it, and in the language of "Mrs. Brown at the Play," from a member of his "very own" profession too.

The "Lancet" has for a considerable period lost few opportunities to decry the dentists, and has ended by offering them a direct and unprovoked insult. It has not only announced that it cannot recognize them as members of the profession—although this recognition has been conceded by the medical corporations and by the legislature—but it has found a pretext to publish the fact that it considers them not fit persons to be admitted to professional intercourse, for to this certainly amounts the declaration that on the grounds of their professional inferiority they cannot be allowed to take part in the discussion of a dental subject in the columns of the "Lancet." This declaration was made in reference to an invitation addressed by the editor to his readers, asking that they would favor him with their views on the practicability of "Extracting Teeth and and putting them back into the Jaw." * * *

The first contribution from a dentist which the editor's appeal has brought forth, forms a fitting sequel to the words and acts of our contemporary. This is from an M. D. practicing dentistry, but as his name does not appear in the "Medical Directory," we cannot say of what university he is a graduate. His qualifications, both actual and nominal, are, however, sufficient to satisfy the editor of the "Lancet" that he is a worthy member of the profession of the honor of which the editor is so jealous. As for the contribution with which he favors the "Lancet," we know not how to treat it, unless to take it as a joke, for it is in both manner and matter an incomprehensible travesty of a scientific composition.

The September number of the "Lancet" contains three articles on the same subject. The first is a remarkable production, and coming as it does from one of "our profession," ought, perhaps, to pass without criticism—at least by a dentist. But we are not that kind of a dentist, hence the following:

"SIR.—A tooth of a single root, or the gum-portion of such a tooth, may be extracted, cleansed, filled, or an artificial crown adjusted, and returned to its former socket, in many cases. * * * The tooth must be more or less shortened, smooth groves formed to help secure retention, which is entirely mechanical; dependent wholly upon lateral or horizontal pressure. * * * A transplanted tooth is a lifeless substance, wholly divested of all means of vital or reciprocal union, essentially a foreign body, alien to all growth of this part tolerating its presence, and always working to throw it out, and prevented only from doing so at once by mechanical impediments. * * * A simple porcelain tooth with fangs would be, perhaps, less objectionable than the one extracted. It would be no more a foreign substance in effect, less subject to changes, might be easily and accurately placed, and would be followed by the healing of the part by first intention, just as well and as soon as a natural tooth, if it were well provided for in its retention by mechanical support."

Reader, note the facts that the tooth must have a "single root," that it "must be more or less shortened," and "smooth grooves" formed, that the retention is "entirely mechanical," the tooth itself a "lifeless substance" and "essentially a foreign body;" and finally, that a "simple porcelain tooth" would answer every purpose. Has

a dental journal ever published such bosh, such twaddle, and retained its subscribers? Though not the "oldest inhabitant," we venture the opinion that it never has. The perpetrator of the article in question signs himself "Alfred Blandy, M. D." Let us have peace.

In the "British Journal of Dental Science," for July 15, we find a paper by Mr. W. Matthews, on "Causes of Irregularity in the Position of the Teeth." He quotes a paper by Mr. Coleman, in which it was shown by that gentleman "that the excess of space afforded to the bicuspids by the loss of the temporary molars is not, as was formally supposed, taken up by the canines, but is seized upon by the first permanent molars." He repeats a statement that has been made time and again on this side of the water, and as often disputed, that "teeth after their eruption, do not appear to possess any natural tendency to arrange themselves in the form of a natural dental arch, but appear to be brought into position by the action of the tongue and lips." One might question their having a tendency to erupt crown first, and account for that fact by calling in some outside agency. True, as suggested further on, the position of the teeth is determined to no little extent by the soft tissues in contact with them, but it is asking too much of the reader to deny a "natural tendency to arrange themselves in the form of a natural dental arch." The "natural tendency" of noses is to grow downward and outward on the face, of arms to grow from the sides of the body, and of legs to grow downward from the lower end of the trunk. The "natural tendency" in all these instances is as great, or greater, than is it the natural tendency of a dead man to "turn up his toes."

The writer hits the primary cause of irregularities of the teeth fairly and squarely when he charges it to want of use—"little work that now-a-days our jaws are called upon to perform." It might be asked how is it that teeth fail to undergo the same change as jaws —why should not the changes correspond? It is stated as a fact of importance by naturalists that when an organ becomes rudimentary it is practically at a stand-still, and, also, that in *becoming* rudimentary its changes are necessarily slow. The chances of its again becoming an important organ are greater than that it will be rooted out. It is claimed by some that teeth are rudimentary organs—that

some have been lost, that others are on the road to extinction, and that food as we now have it has all but done away with the necessity for teeth at all. If these things be true, their extinction is but a question of time, for there is no reason whatever for believing that mankind will ever go back to food that makes business for teeth and jaws, while food requiring no further effort than swallowing may readily be obtained. The recognition of this fact would save many a dental meeting from "borous" talk about oatmeal, cracked wheat, "the whole grain," etc. Men walk when they must, ride horseback or in a carriage when they can, and never take an "accommodation" train if an "express" is to be had. What civilization seems to be looking and working for is a kind and form of food that can be "bolted" in a trifle less than no time, and that will sustain the victim during the hours usually devoted to business, pleasure and sleep.

Mr. Matthews brings in sexual selection to account for some of the irregularities seen in the teeth and jaws. He says "men have, for centuries, admired small, non-protruding maxillæ, * * * and at the present time no one—at least no one with any taste—admires a person with the large protruding jaws of the savage." At the same time, it is well to beware of these little-jawed women. They talk faster than big-jawed ones, and have been the cause of a deal of unpleasantness in every sphere of social life.

Constitutional causes are next taken up and commented on, and special forms of irregularities considered. The paper contains numerous and extensive quotations, direct and indirect. One of the latter reads as follows: "It has been thought by an American writer on this subject, that a child sometimes inherits the jaw-bones of one parent and the teeth of another," etc. What "American writer" does he refer to? We might guess a name suggestive of "Oral Deformities," and not be far out of the way. If the guess happened to be right, it would be interesting to know why the name had been suppressed. This suppression or omission stands out plainly, for the reason that *all other* quotations and references, direct and indirect, are duly credited.

In the same number Dr. A. Combe speaks of the degrees of pain suffered by persons to whose teeth applications of arsenious acid have been made. He puts it as a principle that "the pain caused

by the application of arsenic to the pulp varies directly according to the amount of inflammation present."

The number for August 2, tells all about the presentation of testimonials to Messrs. John Tomes and J. S. Turner, "in recognition of their eminent services to the profession as President and Secretary of the Dental Reform Committee." The testimonial to Mr. Tomes was a "counterfeit presentation" of himself, "the work of an artist rapidly rising in his profession;" that to Mr. Turner, a clock suitably inscribed. The proceedings, which must have been very interesting, wound up with a dinner—as all proceedings do in England. We wish our own gatherings might wind up in the same way. Good fellowship is one of the surest outgrowths of a full stomach. Selah.

August 16th, the editor sits on the "Dental Review," the prospective "organ" of the British Dental Association, in this fashion:

"The reasons given by Mr. Tomes why a society, containing, with all its recent additions, only some four hundred members, has been compelled to start its own 'organ,' are three in number, and the statements here made could only refer to ourselves and to a journal which is now practically defunct. First, it is needed 'to express authoritatively the actions and views of the Association.' As to this, we shall always be ready to record the acts of the Association and its views also, so far as they appear to us to be in accord with the interests of the profession at large. But if the Association is to exist for the benefit of a few, then, perhaps their journal may be useful, for they will get no help from us. We hope, however, this is not to be. Secondly, the said organ is to be 'published with regularity.' Here we must plead guilty, though with extenuating circumstances, and with promises of future amendment. Lastly, it is to be 'wholly independent of the crippling considerations of pecuniary gain.' This is the unkindest cut of all and the most uncalled for. Whatever may have been our literary demerits, our worst enemy cannot fairly assert that we have ever sacrificed principle for the sake of popularity or for any venal consideration whatever. That the management of the 'Dental Review' will be conducted in a manner 'wholly independent of the crippling considerations of pecuniary gain we have no reason to doubt,' but we are not so sure that the Association may not feel the crippling effects of pecuniary loss. The present resources of the Association appear to us none too large for the p essing work it has on hand, and, with all respect for the opinions of Mr. Tomes and his colleagues, we cannot help thinking that the acquisition of this expensive luxury might have been deferred for the present."

The election of Mr. T. C. White to the presidency of the Quekett Microscopical Club, is duly noticed. Mr. W. is a dentist, and accomplished as a microscopist.

The "Monthly Review of Dental Surgery" for September notices the presentation to Mr. C. J. Fox, of the B. J. of D. S., for valuable services rendered in the cause of dental reform, of a purse of 100 guineas. We congratulate him on the receipt of this well-earned testimonial; also the good will implied on the part of those who made up the purse.

The "American Journal of Dental Science" for September has an editorial on "What Others Say." It reviews an editorial which appeared in the "Medical Record," a weekly journal published in New York. It seems that the medical man thinks very poorly of dentists and the value of scientific work accomplished by them. He says, "It is a fact, however, that the demand for highly educated dentists is not yet great enough to justify more than a small proportion of that profession in getting a medical diploma." Prof. Hodgkin's comment is anything but bad: "It certainly has not been the observation of most of us that those who come from medical colleges to us, *brought with them acquirements, or do us honor.*" We propose to look into this matter a little next month."

L.

IRREGULARITIES OF THE TEETH AND THEIR SURGICAL TREATMENT.

BY FRANCIS FOX.

Early decay of teeth which marks the present generation is due, the author thought, to malnutrition occurring in the earlier periods of life. At about seven months after birth a process of absorption is set up in the walls of the crypt and parts superimposed, and by this process the crowns of the temporary teeth become visible above the surface of the gums. When the crowns of the teeth have erupted this absorptive action for a time ceases; and a renewal of the developmental process ensues, by which the alveoli are built up around the roots of the teeth. At about four years of age the temporary dentition is perfected, and soon after this perfection is reached absorption again sets in, commencing now in the roots of the teeth, and

these, together with their alveolar processes, are gradually removed, their permanent successors replacing them by a similar process of absorption of crypt and development of alveolar structures.

The important point to bear in mind is the fact that the alveolar portion of the jaws is developed with each dentition, so that a previous alveolar structure can have little to do with the position of the succeeding teeth, except as it may present an obstacle to their onward progress in consequence of its non-absorption. As to the development of the jaw bones, these bones consist of two portions, (1) an alveolar structure, developed with the temporary teeth, absorbed with them, and again re-developed with the permanent teeth; and (2) a basal portion. This base is more prominently marked in the lower jaw, in which the inferior dental canal very emphatically indicates the junction between the two portions of the bone. The base of the jaw when once formed remains in pretty much the same condition throughout life, except in advanced old age, when the muscles of mastication are no longer in full use, and then in a slight degree it becomes wasted. In the superior maxillæ at birth the alveolar processes descend but little below the level of the palatal plates, and the anterior and posterior parts are but little developed. As age advances the alveoli lengthens, the tuberosities increase in size, and an active development of bone takes place in these situations. The tuberosities are to the upper maxillæ what the coronoid processes are to the lower jaw. From these points the alveolar line is lengthened. In the lower jaw an alteration in the position of its articular surfaces and ascending rami, together with an absorption of the coronoid processes, accompanies the development of the posterior permanent teeth. The jaw elongates by additions to its posterior cornua. The capacity of the jaws in childhood is nearly equal to the anterior portions of the adult bones; for the ten anterior teeth of the permanent set in each jaw replace the temporary, and occupy the same position as these, so that this part of the jaw in adult life is pretty much the same as in childhood. If contracted then it will remain so throughout life, and no subsequent development in the posterior regions will tend to expand it. The replacement of the temporary teeth by their successors is effected by a purely physiological process, and is absolutely independent of pressure.

There seems to be a physiological law by which the cells composing the absorbent papilla in the neighborhood of a developing tissue have the power of absorbing a mature structure. That pressure has nothing to do with the process may be proved by the fact, that in cases where the shedding of the first teeth has taken place prematurely, a layer of bone has been observed to intervene between the crown of the advancing tooth and the base of the socket of its predecessor. At the time when the temporary teeth are about to be shed, in the well-developed jaw a decided separation between contiguous teeth is noticeable; and this circumstance is a fair indication of a future regularity in the succeeding dentition, and a proof that this portion of the jaw has already been prepared to receive the larger permanent teeth. If the process of absorption continues uninterruptedly, the roots of the temporary teeth will be gradually removed, leaving little more than the shells of the crowns, which readily drop from the gum as their successors are in turn ready to occupy their places. But should any arrest in this process occur (and such is far from an uncommon circumstance), these temporary organs are liable to offer considerable obstacles to the regular advance of their permanent successors.

The causes of irregularity in the position of the teeth may arise during the developmental periods of life, and are then due to a want of proportion in the size of the teeth and jaws, or to a faulty development of the jaw bones; or the displacement may depend on some accidental circumstances arising subsequently, such as the prolonged retention of the temporary teeth, the presence of supernumerary teeth, the habit of "thumb-sucking," or the undue pressure from an hypertrophied tongue. There is abundant evidence to prove how frequently such deformity depends upon hereditary influences. The conditions of life to which our race has for many generations been subjected seems to have lessened the necessity for the broad and well-formed jaws which were so characteristic of our ancestors, and for many years the advances in civilzation have been marked by a deterioration in the capacity of our jaw-bones. Mr. Coleman, in some interesting investigations made several years ago, found that the percentage of contracted jaws was immeasurably greater in the children of the well-bred population than in those of less refined cultivation. The prolonged retention of temporary teeth is fre-

quently associated with irregularity in their successors, and is probably often the cause of such irregularity. The presence of supernumerary teeth in the dental arch may prevent the normal members from assuming their proper places; but doubtless a disproportion of size between the teeth and jaws is of all causes of irregularity the most common. This disparity leads to a crowding of the teeth, sometimes to such an extent as to altogether prevent the eruption of some one or more of the dental series, such remaining impacted in the substance of the jaws. Certain injuries in early life may occasion displacement of the teeth, especially in the lower maxilla, such as the contraction of cicatrices about the face and neck. Mr. Salter, in his work on Dental Pathology and Surgery, treats the subject of irregularity of the teeth under two heads—(*a*) simple regularity, in which the misplacement is confined to one jaw, and is independent of the position of the teeth in the opposite jaw; (*b*) compound irregularity, which depends upon the position of the teeth in the opposing jaw.

In "simple irregularity"—that is, where the misplacement is confined to one jaw—the crown only of the tooth may be irregularly placed, the apex of the root retaining its normal position; or the entire tooth may be displaced, or faulty in its development. Such irregular teeth are often entirely removed from the dental arch, and may be impacted in the substance of the jaw-bones. In the former condition, when the apex of the root retains its normal position, much good may be effected by judicious treatment, but in the latter case little can be done to remedy the evil, except by the removal of the displaced tooth. As examples of "simple irregularity," we may mention the appearance of the upper canines above the alveolar ridge, or in the palate, owing to insufficient room for them in the dental arch. An early loss of their temporary predecessors, by permitting the first bicuspid and the lateral incisor to approach each other, is not unfrequently the immediate cause of this displacement. Sometimes, however, the retention of the temporary canine, or the presence of a supernumerary tooth, will occasion its deformity.

An overlapping of the incisors is another form of "simple irregularity," and frequently requires for its treatment a resort to some mechanical appliance in order to obtain regularity in the position of these teeth. Another not uncommon form of irregularity is where

an incisor tooth is more or less twisted, sometimes to such a degree that the side of the crown will occupy the position of its anterior surface. A forcible twisting of the tooth into its right position is very generally adopted. Some, however, are averse to this prompt treatment, and suggest the employment of a plate carefully adjusted to the palate, and having certain properly constructed points of resistance. An unsightly separation of the central incisors in the upper jaw sometimes occurs, and the teeth may be readily drawn together, but have a great tendency to return to their former position.

In treating these cases, great care should be taken to prevent the ligature from slipping below the edge of the gum—between the necks of the teeth and the gum—for the irritation set up by such a mishap has been known to cause the death of the tooth. In order to prevent this displacement of the ligature, a small vulcanite plate may be constructed, to which the ligature can be attached, and thus prevented from shifting its position. The second form of irregularity of the teeth—that depending upon the position of the teeth in the opposing jaw—is much more complicated. As an example, might be cited the "underhung jaw," in which the "bite" is intersecting; some, or all of the six front upper teeth being shut behind the corresponding teeth in the lower jaw. This condition, in its extreme extent, arises from an undue development of the lower over the upper jaw, or from a want of development in the superior maxillary bones. It may also arise from a retardation in the eruption of the superior incisors, or by these teeth being pushed inwards by the prolonged occupation of the dental arch by their temporary predecessors. An early treatment of this irregularity is all.important, and should consist in preventing the contact of the opposing teeth.

An opposite condition of the lower jaw sometimes occurs, in which the lower incisor teeth bite close up to the palate, so that they press against the necks of the upper teeth, and push them forward. A separation of the teeth in the anterior portions of the jaws has been described, and is occasioned by a congenital malformation of the lower jaw. The early obliquity in the position of the ascending rami is unduly maintained, and there is a want of development in the alveolar portions of the jaws, especially in the regions of the molar teeth. This irregularity may be caused by the contraction of a

cicatrix in the throat or neck. The bicuspid teeth are not infrequently misplaced, and, when so, they usually occupy a too inward position. This may arise solely from their having been prevented from assuming their proper position in the dental arch by the prolonged retention of the temporary molars. But usually it is dependent upon a diminished capacity of the jaw, and in the upper jaw is generally associated with a projection of the incisors, and a more or less elevation of the palate constituting the V-shaped jaw, or "rabbit-mouth." This malformation is congenital, but, except in very exaggerated cases, is not very manifest until the posterior permanent teeth are about to be erupted, when the additions to the superior maxilla have been made in the posterior regions.

The newly-formed bone, which has been gradually developing, is now found to be placed at an angle with the pre-existing alveolar line. This abnormal development has arisen in order to effect an harmonious arrangement with the other bones of the cranium. The maxillary bones having been imperfectly developed during early childhood, their posterior borders not being sufficiently divergent, the subsequent additions for adult confirmation are placed in a wider circle; hence the point of junction between the two parts (the old and the new, so to speak), is marked by an angle of more or less extent. It is usually associated with great delicacy of constitution, and may occur in those of weak mental powers, but is often observed in persons of great intellectual capacity. The treatment of these cases consists in endeavoring to gain increased space in the dental arch, and to diminish the projection of the upper front teeth; but is, as a rule, more or less unsatisfactory. Irregularity in the wisdom teeth is sometimes met with, and may occasion most serious mischief, when extraction is the remedy. Transposition of the teeth is rare, and is usually met with anteriorly; and also inversion, which is still rarer.—*London Lancet.*

JUDICIAL DECISION.—The Supreme Court of the United States has affirmed the decision of Judge Shepley, in the case of the Goodyear Dental Vulcanite Co., appellant, vs. Charles G. Davis. This decision disposes of the controversy relative to the use of celluloid for dental plates, and declares that its use is no infringement on the Cummings' patent.

EDITORIAL.

CLOSE OF THE TWELFTH VOLUME.

This number completes the current volume and closes the twelfth year of the publication of this journal.

The MISSOURI DENTAL JOURNAL was brought into existence as an independent journal, and although it was published for a time by a mercantile firm, it has always preserved its independent character, and adhered to the original design of its founders. Its editors have ever been untrammelled by private interests, and have steadfastly regarded the well-being of the dental profession as the paramount consideration.

This course will be continued in the succeeding volume, and no effort will be spared to maintain its position as the leading dental journal in the West.

Now that the continuance of a dental journal, resting exclusively upon its merits, and divested of all indirect means of support, has become fully assured, we confidently look forward to that continued increase in circulation which has been so marked a feature of the last two years.

PROFESSIONAL AMENITIES.

The Chicago Dental Society gave its first annual banquet on the 8th instant at the Palmer House, to which a goodly number of dentists from other towns and cities were invited.

About forty gentlemen sat down to the well-filled tables, who after fully discussing the ample spread of viands, indulged in toasts and speeches till a late hour.

The occasion was thoroughly enjoyable and one that will be remembered with great pleasure by every one present.

DR. GEORGE S. FIELD, of Detroit, lately entertained his professional friends in his new, spacious and elegant apartments, into which he has just moved, located in "Abstract Building." Nearly every practicing dentist in the city of Detroit was present, and after partaking of a sumptuous collation, spread in one of the rooms, they spent an hour or two in social enjoyment.

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